THE ART OF DISSECTING THE HUMAN BODY,

MANCHESTER MEDICAL SOCIETY.

IN A

Plain, Eaſy, and Compendious METHOD.

WITH

The ſeveral Inſtruments neceſſary, curiouſly engraved; wherein all the different Parts of the HUMAN BODY are deſcribed, but particularly the MUSCLES, in a full and accurate Manner, and their Uſes clearly explained.

Tranſlated from the Latin of LYSERUS.

By G. THOMSON, M. D.

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THE PREFACE.

WE have only two Ways of coming at the Knowledge of a Machine, either to be taught the whole Contrivance by the Maker, or to take it intirely to Pieces, and examine what each Part is capable of in a ſeparated, and in an united State. But the Generality of Enquirers into the human Structure, have thought that they had better take their Knowledge of it from Books or Plates, than be at the Pains to examine thoroughly with the Knife. Chemiſtry has, in all Ages, found Private Men, and even Princes, very ready to erect Laboratories, but few have purſued Anatomy, that moſt noble, valuable, and uſeful Science, *with equal Ardour, till very lately. This Neglect was owing to ſome Diſſectors, who, being willing to conceal their Ignorance, reſted ſatisfied with, and demonſtrated only, what the Antients had done before them; and that they might appear compleat Maſters of this Science, never had the Sincerity to own that any Part ſtill remained to be known. The Works of our Predeceſſors contain very fine Experiments; but they would have deſerved a great deal more Commendation, and been more uſeful to thoſe who diſſect, had they carried their anatomical Encheireſis to a greater Length, the Knowledge whereof is the beſt Introduction to the nicer Parts of Anatomy, on which that of the animal OEconomy chiefly depends.*

Hence we may ſee, that a Perſon who would be throughly acquainted with

with Anatomy, ought not to be a continual Spectator, but take hold of the Knife, in order to ſatisfy himſelf, and convince others. For the Aſſiſtance of ſuch as incline to make themſelves Maſters of this curious Art, our Author has laid down moſt plain, eaſy, and compendious Rules, of whom the learned Dr. Boerhaave, *in his Method of ſtudying Phyſick, gives this great Character.*

" M. LYSERUS travelled almoſt " over all *Europe*, and was eſteemed " the greateſt Maſter of diſſecting Bo" dies wherever he went ; I would " therefore adviſe every Student to " read his Book on that Subject, in " which he teaches how to prepare " and preſerve the different Parts of " the human Body, and to diſſect ſo " exactly, that in the Operations one " Muſcle may not hinder the Diſſec" tion of another."

By obſerving our Author's Rules, one may acquire a thorough Knowledge of the human Body; and I muſt ſay, I cannot help wondring at thoſe who take upon them to rectify the Body when out of Order, and at the ſame Time know nothing of the curious Contrivance of its Parts, which makes it impoſſible for them to know when, or how to apply a proper Remedy. When human Bodies cannot be had, we ought to exerciſe ourſelves with Animals; for by them we may learn to know the Parts, how to diſſect, trepan, or perform any other chirurgical Operation. We may likewiſe make different Experiments without opening the Cranium, *by applying Medicines externally, by mixing them with the Food, and by Injections into the Veſſels, in order to diſcover what diſturbs the animal Actions, and what is moſt proper to reſtore them when diſordered.*

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INTRODUCTION.

SECT. I.

Of the Subject of ANATOMY.

ANATOMY ſeems now to be the chief Province of thoſe who apply themſelves to the Study of Phyſick; for as they in all their Operations, aim only at the Support and Preſervation of the Human Body, ſo they unanimouſly make it the proper Subject of Anatomy, becauſe from thence they endeavour to come at the Knowledge of the Situation, Connexion, Figure, Magnitude, and Uſes of the ſeveral Parts, that compoſe the Human Syſtem. It muſt be allowed, that the Diſſection of Animals, if performed while alive [*], is of great Service in finding out the Uſes of their Parts, yet the like Inferences cannot be drawn from theſe with the true Objects of Anatomy, becauſe the Diſſection of Brutes is only accidental, and therefore cannot be reckoned the true and proper Subject of Anatomy, except it be taken in a general Signification, namely, as far as Anatomy has a near Relation to Natural Philoſophy. But this laſt being foreign to my preſent Deſign, I ſhall therefore confine myſelf to that, which properly belongs to a Practitioner in Phyſick, and now attempt to give a few Directions concerning the Choice of thoſe Human Bodies that are the moſt proper Subjects for Anatomy, if they can be come at.

Human Bodies in general are either in a good or bad State of Health. The former are the moſt proper for our Purpoſe, while we endeavour to find out the natural Conſtitution of thoſe Parts that compoſe the Body, and therefore ought to be ſuch as have ſuffered a violent Death, eſpecially thoſe who have been hanged, or ſtrangled [†]. But if we want to find out the Nature and Cauſes of Diſtempers, the latter are preferable, and it were greatly to be wiſhed, that we had more frequent Opportunities than we actually have, of inſpecting the Bodies of thoſe who died of any remarkable Diſtemper, becauſe this would be of particular Service and Advantage, both to the Patient and Phyſician.

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[*] Of which *Galen* diſſected no leſs than ſix hundred.

[†] It is for this Reaſon that *Riolan* rejected thoſe who had been drowned, though *Galen* made choice of them.

Beſides theſe, ſeveral other Differences are to be obſerved in Human Bodies, namely, as to their Sex, Age, Quantity, and Quality.

As to the SEX, the Males and Females muſt be diſſected, to come at the Knowledge of the Differences of both Sexes, and the Conſtruction of their Genital Parts. The Diſſections of big-bellied Women, are alſo of particular Uſes in the Practice of Phyſick.

As to AGE, thoſe who die in their Prime, or full Vigour, are the moſt proper Objects of Anatomy, becauſe they are not ſo full of Juices as Children, nor are they ſo much emaciated, and deſtitute of Blood as old People are. However, it is abſolutely neceſſary to anatomize Children, in order to find out the Differences between them, and thoſe of riper Years. Fætus's are likewiſe proper Subjects of the Knife, for ſeveral Reaſons.

In reſpect of QUANTITY, we ought to pitch upon the largeſt and talleſt Bodies, becauſe, according to the general Rule, the Parts are in Proportion to the Body; theſe therefore in the leſſer Parts will be more viſible.

As to QUALITY, a due Regard muſt be had betwixt *fat* and *lean* Bodies. For my Part, I had rather chuſe a lean than a fat Body, if it be not quite emaciated and deprived of all its Juices; for if the Body is too fat, it will be a difficult Taſk to raiſe the Muſcles, and prepare the Parts of Generation, as is plain to thoſe who have been at, or employed in the Diſſection of a Human Body. Therefore, to ſpeak in a few Words, what I have ſaid before, concerning the Subject of Anatomy, I look upon a young, luſty, ſound Body, not too lean nor too fat, the moſt proper Subject of Anatomy.

SECT. II.

Of the Anatomical Inſtruments.

HAVING made Choice of a good Body, you are next to furniſh yourſelf with fit Inſtruments for performing your Operations; of which there are two Sorts; one for Ornament, another for Uſe: I ſhall paſs by the former and treat of the latter, of which there are twelve; viz, a *Needle*, *Thread*, *Diſſecting Knives*, *Small Hooks*, a *Whet-ſtone*, *Spunge*, a *Pair of Sciſſars*, *Probes*, a *Small Tube*, a *Pair of Bellows*, a *Saw*, and an *Elevator*.

1. Before you enter on the Diſſection, you are to uſe a *Needle*; the moſt proper for piercing the Skin is that edged like a Shoemaker's Awl. Some place the Needle-caſe oppoſite to that Part of the Skin where they intend to ſtick the Needle in, for preventing the Skin from giving way to the Needle, and conſequently furthering its Penetrations through the Skin.

2. You muſt next have *Thread*, which muſt be waxed for ſtrengthening and fitting it for Ligatures. Though the Manner of making Ligatures is ſufficiently known, yet thus much may be added, that thoſe Veſſels and Ducts, which are the proper Objects of Ligatures, being ſlippery on the Outſide, are conſequently apt to let the Ligature ſlide off; therefore to remedy this Inconvenience, you are to draw your Needle and Thread through the very Subſtance of theſe Veſſels or Ducts, and afterwards tie them by winding the Thread round them. This is of great Uſe, and particularly to be obſerved in tying up the Trunk of the *Cava* coming out of the Liver.

3. Your *Diſſecting Knives* muſt be made of the beſt Steel, and as ſharp as Razors. Anatomiſts have invented ſeveral Sorts; but two are ſufficient to anſwer all the Ends for which they are intended; *viz.* that called by *Galen* the *Myrtle Knife* from its reſembling in Shape a Myrtle Leaf, and the other the *Diſſecting Knife*. If the firſt be ſmall and taper, it comes under the Denomination of a *Small Sword:* the latter, called by the *Greeks* εκκοπτες, having its Point crooked like a Hawk's Beak, is often termed the *Crooked Knife*.* For

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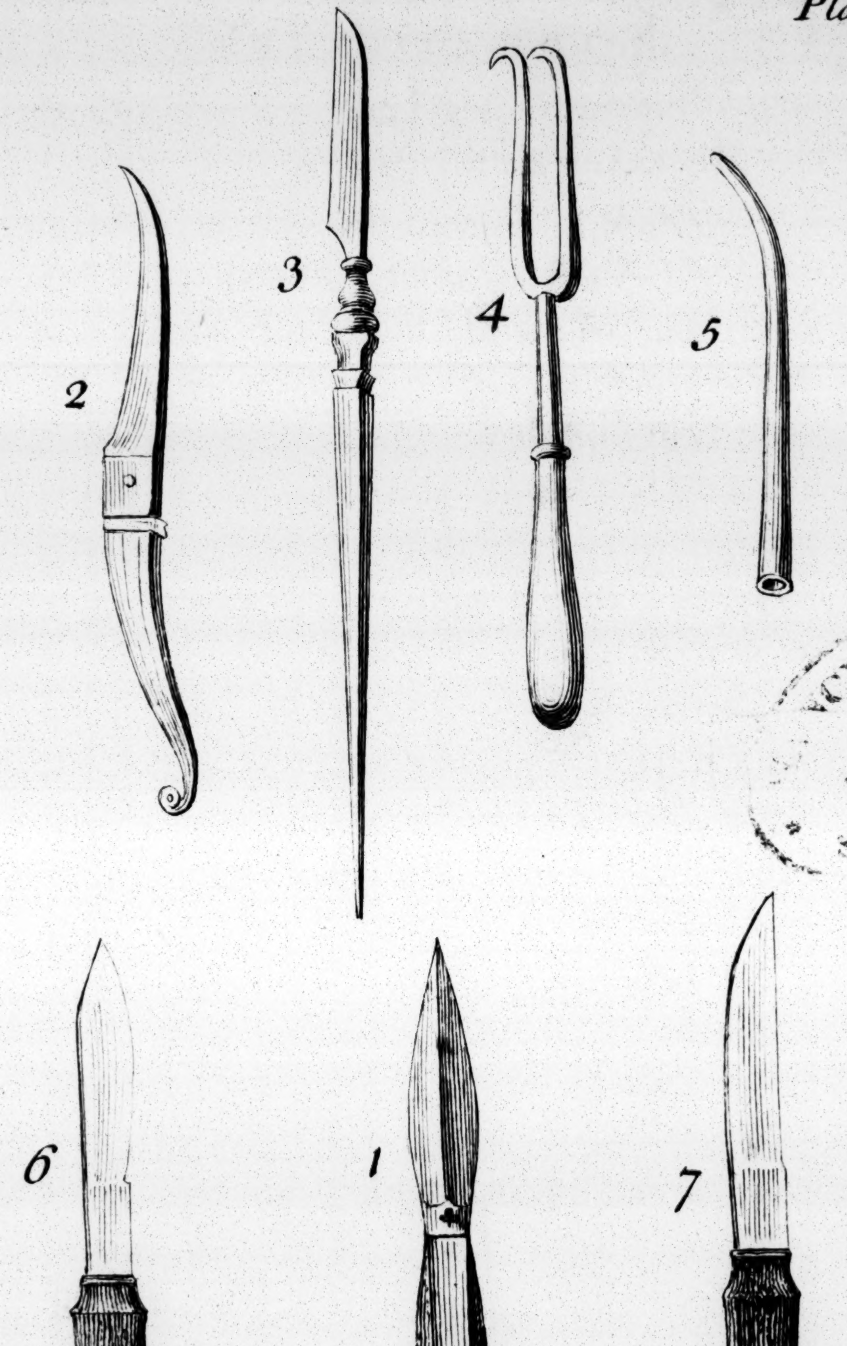
* There are alſo two other Knives now uſed in Diſſecting, *viz.* the *Round edged Knife*, and the *Strait edged Knife*. See the Plates.

the

Fronting Page.6

Plate.I.



the Operations of the Head, you muſt have a larger Knife about two Hands in Length, and an Inch in Breadth, which is denominated the *Broad Razor*. Some, to make the Knife enter more ſteady and firm, place the Middle Finger, guarded with a ſemicircular iron Plate, under it. Every Anatomiſt may chuſe what Handles he thinks moſt proper for his Knives.

4. When you are to take hold of any Part, it muſt be done with ſome *Small Hooks*, which are of two Kinds, *viz.* ſuch as are double pointed like common Forks, but theſe Points muſt be bent or crooked; or ſuch as have only one crooked Point.

5. You muſt have a *Whet-ſtone* and *Strap* for ſetting and ſharpening your Knives.

6. You muſt have a *Spunge* for wiping off the Excrements and drying up the Humidities or Blood that ouſe from the diſſecting Parts.

7. You muſt alſo be furniſhed with ſolid *Probes* like Bodkins, called by ſome *Spicilla* and *Oricularia*, and, erroneouſly by ſome of *Galen*'s Interpreters Plates, for tracing the Paſſages and Extent of the Veſſels; and as theſe differ in Magnitude, ſo you muſt be provided with ſmooth Probes of different Sizes, having at one Extremity a round Point or Bead of a

ſmall globular Figure. Theſe Probes are either made of Silver, Iron, Steel, Tin, or Boxwood.

8. You muſt have a *Pair of Sciſſars* for cutting the Membranes; and thoſe made uſe of in cutting the Coats of the Eye muſt be very fine, ſmall and ſharp pointed.

9. You muſt have a *Tube* for opening the Ducts, either by inflating or injecting them, in order to find out the Extent and Opening of the ſeveral Paſſages. The Extremity to be inſerted into the Ducts muſt be ſmall and a little bent, but the other may be ſomewhat larger. You ought likewiſe to have ſeveral ſtreight Pipes, in order to put into the Orifice of another, as Occaſion requires, whoſe Length muſt depend upon every ones Pleaſure.

10. You muſt have a *Pair of Bellows* for inflating and extending ſeveral Parts belonging to the Human Body, and ſince every one knows what belongs to a Bellows we need not attempt their Deſcription.

11. You muſt have ſuch a *Saw* as is uſed in Amputations for opening the Scull. This Inſtrument muſt be made of the beſt Steel, and the leſſer the better, providing it be ſtrong enough for the Operation.

12. The laſt Inſtrument is the *Elevator* for raiſing up the upper Part of the Skull, after ſawed round. It is no Matter of what Form or Shape it is, providing it be ſo fitted as to enter the Cleft of the Cranium in order to pull up the Skull, which, even after ſawed aſunder, will adhere very cloſe and firm to the *Dura Mater*.

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SECT. III.

Some general Rules to be obſerved in Diſſecting.

I Would have none admitted to ſee Diſſections but thoſe who have made Phyſick or Surgery their Study: and even in this I would not be ſo ſtrict as *Riolan*, who excludes all young Students, and eſpecially Beginners, the Liberty of ſeeing or viſiting Diſſections; becauſe, ſays he, if they ſhould prove tedious and difficult, this may deter and oblige them to quit their Studies. But this, in my Opinion, is trifling, and demeaning the Character of a Student in Phyſick, who, by indefatigable Labours and Induſtry, ought to ſurmount all Difficulties, in endeavouring to raiſe his Knowledge to the utmoſt Pitch, and be ever mindful of that Saying of the Oracle, ὀυδὲν ἄνευ πόνȣ τοῖς θνητοῖς διδȣ͂σι ὅι αθανατοι. *The immortal Gods have given nothing to Man without Labour.* Therefore, I think, all Students of Phyſick and Surgery, ought to be admitted, and others rejected: the former muſt be preſent to be inſtructed in Anatomy and the Art of Diſſecting; but the latter ſhould be excluded, leſt they ſhould take the Liberty of finding fault with, and miſrepreſenting the Operations of Anatomiſts. For to perform every Operation in ſuch a Manner as to have the Approbation of all, ἔνεϛι τῶν ἀδυνατων, *is attempting an Impoſſibility.*

The PROPER SEASON for Anatomical Preparations, is the Winter, becauſe Dead Bodies keep longer in cold than in hot Weather. *But if*, ſays *Riolan*, *you have an Opportunity of diſſecting a Female Subject in Summer, you muſt not then refuſe it, becauſe this*

this does not ſo often come under your Hands as a Male. However, to prevent its ſudden Putrefaction and Corruption, let it be laid, while diſſecting, upon Scordium or Periwinkle, and, when you have done, cover it over with the ſame Herbs; likewiſe waſh the Internal Parts with Salt Water, or Spirits, and afterward depoſite the Body all Night in a Vault or ſome ſubterraneous Place.

The firſt Operation to be taken in hand, is *To Clean the Body all over.* Neatneſs muſt be minded as much as poſſible, without which the Diſſection will be both tedious and nauſeous to the Spectators. For,

Gratior ut pulchro eſt veniens in corpore
virtus.

So Anatomy will always be more agreeable, and attended with greater Succeſs, when managed by a clean neat Hand. *Riolan* deſires alſo that the Body be ſhaved, becauſe the Hairs are apt to blunt and ſpoil the Edges of the Knives.

Theſe Operations ſhould be performed in a *Cold Place*, therefore the Anatomiſt ought to have a Fire-pan for warming his Hands now and then, but allow no Fire to be made in the Room where the Body is, becauſe a warm Hand will ſoon reduce the rigid Members to their proper Tone.

You muſt have *A Room well lighted* for your Operations, without which you can never be able to ſee all the minute Parts of the Body, which are only deſcernible by a very quick Eye. Some chuſe to diſſect in a dark Room, and prefer the Light of a Candle to that of the Sun, but I am rather for the Light of the Sun, and adviſe that the Body intended for Diſſection be laid upon a Table, moving eaſily round, that ſo you may more conveniently turn every Part thereof to the Light, as Occaſion ſhall require. This moving Table is abſolutely neceſſary in publick Diſſections, for every one ſtanding round to have a full View of what Parts are propoſed by the Anatomiſt. Let your Hand hang free while you are diſſecting, by which you will be able with more Dexterity and Conveniency to perform the Operations, than when it is either leaning upon the Body or Table, becauſe you may more eaſily direct your Hand at pleaſure, and better apply it to the *Middling Section.* I call that a *Middling Section*, when you go no deeper with your Inciſion than the Part to be diſſected, or do not hurt the ſubjacent Parts.

Under the Denomination of Sections, come alſo that Separation performed κατά Δάρσιν, or by *Excoriation*, which will be often mentioned hereafter. What this Separation is will appear pretty plain from the following Paſſage of *Galen*, The true Subject of *Excoriation*, or Parts to be ſeparated, κατα Δαρσίν, are, when theſe Parts are compoſed of a Contexture of very ſmall numerous Filaments, like Cobwebs. Theſe thin Membranes may be eaſily ſeparated by the Fingers, yet it is much more proper to ſeparate them with the Knife, that you may ſee what you are about; which cannot be done, if you ſeparate them with the Fingers, becauſe the Points will be ſmeared and intercepted.

You are often to wipe off the liquid Subſtance with a Spunge on account of its being very troubleſome, and if you'll credit *Galen*, nothing ſo much diſturbs the manual Operations in diſſections as the Conflux of Blood and other Humours. If you ſhould by chance happen to cut one of the great Veins which will be attended with a continual Effuſion of Blood, you are to ſtop it by a Ligature made on the Vein above and below the Inciſion. If, in diſſecting a live Animal, you wound a Veſſel, *Riolan* and *Galen* adviſe you to cut it aſunder, becauſe, ſay they, both Extremities will contract themſelves backward within the Subſtance of the Fleſh, and ſo both Orifices will be ſtopt. But I very much doubt the Truth of this Aſſertion, which will ſcarce ſucceed, eſpecially in the larger Arteries, in which the Blood, mixing with a greater Force, will make its Way wherever it finds the leaſt Paſſage.

Having finiſhed your firſt Days Work, you are carefully to cover up the Body, it being impoſſible in one Day to diſſect all the Parts; therefore, after leaving off, put all the Parts, not yet ſeparated from the Body, in their proper Places. Cover thoſe Veſſels laid bare with a Piece of Fleſh, or a wet Spunge, to keep them from drying too much; then lay the Fat over it, and over that the Skin: but the Inſide of the Skin, as well as the Fat, being ſlippery, they will give way; to prevent which, you may draw together and faſten the Extremities with a Needle and

Thread; afterwards throw over it a Linnen Cloth looſely to cover the whole Body, and keep off the external Air.

When you enter again upon your Diſſections, cut off the Ligatures, and lay open the Skin, Fat, and other Parts, till you have free Acceſs to that Place where you formerly left off.

[illegible] SOCIETY.

MANCHESTER MEDICAL SOCIETY.

BOOK I.

Of the ABDOMEN, *or* REGION *of the* BELLY.

CHAP. I.

Of the Adminiſtration of the CUTICULA, CUTIS, PINGUEDO, *and the* MEMBRANA CARNOSA.

I Would deſire my Readers to follow the Moderns in the Method I am to preſcribe, concerning Anatomical Operations, and begin their Diſſections at the *Abdomen* and its external Parts.

I. *The* CUTICULA,

Or the Scarf-ſkin, called by the *Greeks* Επιδέρμις; which being difficult to be raiſed with the Knife, therefore Anatomiſts only ſhow a Part of it to the Spectators, becauſe it would anſwer no Intention to ſeparate the whole. *Riolan* would have you put your Hand under the *Cutis*, after ſeparated from the Fleſh; and then, by making a gentle Inciſion with the Knife, ſeparate a ſmall Part of the *Cuticula*. But the ſame Operation may be performed, while the Skin is on the Body, though attended with Difficulty, if not impracticable. However, there are other Methods by which the *Cuticula* may be ſeparated and expoſed to View. *Riolan* would have you hold it to a Fire, or a Candle, whoſe Force will raiſe it into Bliſters, which is certainly an eaſy Operation; and for a convincing Proof of this Experiment we often ſee large Portions of the Scarf-ſkin raiſed, when burnt by Gun-powder.

Another way of raiſing the *Cuticula*, and indeed the eaſieſt and beſt, which is either by

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by pouring on the Skin boiling hot Water, till the *Epidermis* riſes, then ſcraping it off with the Back of the Knife; or by immerging the Skin in Water, till the Cuticle with all its Elongations may be ſeparated, and in that Caſe theſe Productions carry along with them the Hairs and Bulbs.

The Cuticle may be raiſed from the *Cutis* by ſharp and corroding Fluids, as in Ulcers ariſing from acrid Humours, and other Tumours. The ſame may be alſo done by tanning the Skin like Leather; for Allum and Salt, the chief Ingredients made uſe of in this Caſe, have a ſtrong corroding Virtue, but this Method requires too much Time.

II. *The* CUTIS.

Having ſhewn the ſeveral Methods of raiſing the Cuticle, we next come to the Adminiſtration of the *Cutis*, or Skin, lying immediately under it; but I muſt firſt ſay ſomething concerning the *Umbilicus*, becauſe all Anatomiſts begin with it.

To raiſe the UMBILICUS, depreſs the Skin on each Side, then take hold of, and pull up the Navel between your two Fingers, or cauſe your Aſſiſtant preſs both *Ilia* ſo with his Hands, that the middle Region of the Belly may elevate itſelf. Sometimes it ſinks ſo low, that you are forced to draw it up with a Hook. Having raiſed the *Umbilicus*, run a Needle with a Wax Thread through it, then tie thereon a Surgeon's Knot, and cut it off at ſome Diſtance from the Navel with a Pair of Sciſſars. This is of great Uſe in diſſecting the *Cutis*, making an Inciſion in the *Peritonæum*, and in demonſtrating the Ligaments ariſing from the umbilical Veſſels, as will appear from what follows.

I now come to the CUTIS, and deſign only to ſhew its Diſſection in the lower Belly, having already demonſtrated its Separation; and if this is once well underſtood, the ſame Operation may eaſily be performed in any other Part of the Body.

Begin at the *Umbilicus*; take hold of it in your left Hand by the Thread, and with a ſharp Knife make a circular or quadrangular Section round it, ſo as the two oppoſite Angles may point exactly to the Sides, and the other two to the *Os Pubis* and *Cartilago Xiphoides*; but take care not to make your Inciſion deeper than the *Cutis*, leſt you cut the ſubjacent Parts. This being done, draw with the Knife a ſtreight Line from each Angle of the Quadrangle upwards to the Middle of the *Sternum*, downward to the tranſverſe Proceſſes of the *Vertibræ* on account of the abdominal Muſcles; but take care not to make your Inciſion ſo deep in the Skin as to touch the ſubjacent Fat: However, the Knife may be thruſt in with ſome Force, becauſe the Skin being here fibrous and nervous, is not eaſily cut, but often ſlides from under the Edge of the Knife; therefore if the firſt Section do not reach the Fat, it muſt be repeated.

Now for the Separation of the *Cutis*: To perform this, deſire your Aſſiſtant to hold the umbilical Thread, and you, with the Nails of your Left Hand, or rather with a Hook, take hold of any Side of the Quadrangle; then keeping the Knife * very light in your Right Hand, ſeparate the Skin from the Fat; but you muſt direct the Inſtrument ſo as the Edge may incline a little toward the Fat, or keep a ſtreight Courſe between it and the Skin; for a Gape in the Fat does not make ſuch an ugly Appearance, as a Hole in the Skin will do[†].

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* The Knife fit for this Purpoſe muſt be a little broad at the Point, and not very ſharp; and if ſuch a Knife is not at hand, the *Myrtle Knife* will ſerve the Turn.

There is another Way of raiſing the Skin from the Fat, but this only is to be performed when the Skin and Fat have been both together cut off from the Body; and are afterward to be ſeparated from each other; for in any other Preparation it is ſcarce uſed, becauſe the Fat would appear very much deformed, on account of ſeveral Inciſions made upon it. The Method is this: Take hold of the Skin with your Left Thumb and Middle Finger, place your Fore-Finger under the Skin to be divided, make an Inciſion about three Inches long, and hold the Knife, ſo as to preſs upon the Skin with its whole Breadth, and its Back at a ſmall Diſtance from it; hence the Fat is liable to be cut, and not the Skin *. Having freed the Skin from the Fat, turn it back upon the Sides *.

[†] *Riolan*, in his *Anthropologia*, ſays it is leſs harm to cut the Skin than the Fat, which he has taken from *Galen*, whoſe Words are to this Purpoſe: *You muſt divide the* Membrana Adipoſa *from the Skin, by gently turning the Knife to the Skin; for if you incline the Edge toward the* Membrana Adipoſa, *you will certainly cut it; but if you cut the Skin in ſeparating it from the* Membrana Adipoſa, *no bad Conſequence will follow*. *Riolan* is here miſtaken; for in a later Edition theſe Words are read in a quite different Senſe. Suppoſing what *Galen* had ſaid was true, it would anſwer no Intention, becauſe it only refers to the Diſſection of Brutes, in which *Galen* was chiefly employed, and not to the Diſſection of Human Bodies, in whoſe Writings we find few or no Inſtances; but this is certainly intended in this Place: For in a Man the *Membrana Carnoſa* is not next the Skin, but the Fat is between them, which is never wanting except in emaciated People. As to the Anatomy of Brutes I am entirely of *Galen*'s Opinion.

III. *The* PINGUEDO,

Lying between the *Cutis* and *Membrana Adipoſa* or *Panniculus Carnoſus*, cannot eaſily be ſeparated from each other without melting the Fat, becauſe the membranous Fibres are ſo interſperſed among the Fat, that they ſeem to form one hetrogeneous Body. Therefore this Membrane muſt be ſeparated along with the Fat from the ſubjacent Muſcles †.

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* *Galen*, before he attempted the Diſſection of the Skin, thought it too mean a Performance for him; but having once engaged himſelf in the Operation, found afterwards to his Experience, that it required a very nice Hand. Hence, ſays he, *it is a Work that requires the utmoſt Care, and is only to be put into the Hand of one who is an Artiſt, and dextrous in uſing the Knife.* If the Operation is ſo difficult in Brutes, what muſt it be in the Anatomy of a Human Body, on account of its very firm Coalition there. Yet I would not from hence deter Beginners from attempting it, as *Riolan* has done, but adviſe to uſe their utmoſt Care in any Part of the Body, but here in particular.

† *Riolan* divides this Membrane into the *Adipoſi* and *Carnoſi*; yet he ſays they are inſeparable, and make but one Membrane.

IV. MEMBRANA ADIPOSA.

You may ſeparate the *Membrana Adipoſa* or *Carnoſa*, with the Fat from the ſubjacent Muſcles, if, after having made with the Knife a Quadrangle round the *Umbilicus*; you make a croſs Inciſion, in form of an X, in the *Cutis* and *Pinguedo*, then along theſe Inciſions pull aſide or raiſe the Fat with your Nails, and by inſerting the *Myrtle Knife*, which muſt not be very ſharp, becauſe they cohere only by thin Membranes, make a ſlight Inciſion by thruſting your Knife gently between the *Membrana Communis Muſculorum*, and the *Panniculus Carnoſus*. Having cut theſe Fibres you will ſee very minute Veins paſſing along the Muſcles, eſpecially the *Recti*, and here and there entring the Fat and the Skin. After you have taken a full View of their Courſe and Direction, then cut them off. When the Fat is ſeparated, fold it back as you did the Skin.

This is the general Method of ſeparating or raiſing the common Integuments of the Body, which is performed almoſt after the ſame Manner in every other Part thereof;

but that this Operation may be compleat, I will endeavour to explain the different Methods thereof in the anatomy of each particular Part.

CHAP. II.

Of the Method of Diſſecting the ABDOMINAL MUSCLES.

G*ALEN* had two different Methods of raiſing the Abdominal Muſcles; one by making an Inciſion among the Muſcles, after having opened the *Thorax*, and taken a View of the *Viſcera*; and the other, by beginning his Inciſion here, according to the modern Method. But this having no Relation to the Operation, I will therefore paſs it, and only put you in Mind that there are ſtill two Ways in beginning the Diſſection of the ABDOMINAL MUSCLES, *viz.* either at their Origines, or at the Commixtion of their Tendons. You are further to obſerve concerning the tranſverſe and aſcending Muſcles, that if you intend to begin their Separation at their Origine, you are to turn the Body on the Side oppoſite to that you deſign to make your Operation, that ſo you may place yourſelf, when you are to begin the Inciſion at the Backſide, and reach the Loins with the Knife.

I. MUSCULI *Obliqui Deſcendentes*

Are thus to be raiſed, by beginning at the Ribs with the Point of the Knife, as Nature herſelf will ſhew. Separate the Tendinous Digitations, or Indentations of the *Obliquus Externus* from thoſe of the *Seratus Major Anticus*, till you ſee the Ribs; and take care in raiſing this Muſcle, not to touch the Intercoſtals, becauſe their Fibres cloſely cohere with each other. This being done, take hold of theſe Digitations in your Left Hand, and uſe the Knife carefully, leſt you cut the Nerves ariſing from the Intercoſtals with their Veins and Arteries which cloſely accompany this Muſcle as its Origine.

Turn the Body on the contrary Side, as was before directed, raiſe that Part of the *Latiſſimus Dorſi*, which near the *Vertebræ*, lies a little over this Muſcle, that you may come at its poſterior Part; then raiſe the Indentations of the *Seratus*, and ſeparate this Muſcle, from the ſubjacent κατα Δαρσίν, or with the ſubjacent *Membrana*, always diſſecting towards the ſuperior and inferior Parts, ſo by Degrees you will come to the Loins, from which you are to ſeparate this Muſcle. Afterwards ſeparate its Tendinous Connexion from the *Os Illium* and *Peritonæum*, by putting the Knife gently under, and carrying it along the *Spine* towards the *Os Pubis*, and ſeparate the remaining Part κατα δαρσίν. It is hard to diſtinguiſh the Tendon of this Muſcle from that of the *Obliquus Aſcendens*, on account of their ſtrict Union.

By beginning at the Inſertion of this Muſcle, you are gently with a ſharp Knife to ſeparate its Tendon from the *Linea Alba*, *Peritonæum*, *Oſilium*, and the Loins; then cut off the remaining Part with the Skin. When you come to the Origine of this Muſcle, you may take a full View of the Blood Veſſels and Nerves above mentioned. This Operation may be more eaſily performed, if you begin your Inciſion at the Spine of the *Oſilium*, then putting your Fingers underneath, the aſcending and deſcending Muſcles may there be ſeparated,

parated. κατα δαρσίν and the Tendinous Beginning cut off with the Knife.

II. MUSCULI *Obliqui Aſcendentes.*

To raiſe the *Muſculus Obliquus Aſcendens*, begin at the Loins, where the nervous Origine of the tranſverſe Muſcles will direct you how deep the Knife muſt go, becauſe it will diſcover itſelf by its white Colour, and ſhew you that it is not now to be touched; and thus you are led to the Beginning of the Diſſection of this Muſcle: Then proceed toward the *Os Pubis*, and ſeparate it from the Margin of the *Oſilium*, by putting your Finger under, and the Knife very deep, after raiſing it from the *tranſverſalis* κατα δαρσίν, and from the Cartilages of the Ribs. When you come to the *Linea Alba*, you muſt ſtop, becauſe of the Intermixture of the Tendons.

If you intend to begin your Inciſion at the Tendon, it muſt be done in the *Linea Alba*; and ſo you may proceed in your Operation, as above directed in the Adminiſtration of the above former Muſcle.

III. MUS-

III. MUSCULI *Pyramidales.*

To come at the Pyramidal Muſcles, remove the fat Membranes, and the Tendons of the *Muſculi Recti*; then make an Oblong Section on either Side. As you proceed draw the Muſcles with your Finger toward the oppoſite Side, and as far as you can ſeparate them from the ſubjacent Membranes; on the other Side proceed in the ſame Manner, till both are freed from the ſubjacent Parts; then make a Longitudinal Inciſion in the Middle, where they are connected by Membranes. Laſtly, ſeparate and cut off the Tendon creeping towards the *Umbilicus*, that you may turn the Muſcles down upon the *Pudenda.*

IV. MUSCULI *Recti.*

The *Muſculi Recti*, have in the Middle ſeveral nervous Innervations, whereby they cloſely adhere to the Tendons of the *Muſculi Obliqui Aſcendentes*; therefore theſe Tendons muſt be ſeparated by a careful Hand, or elſe theſe Interſections will be ſpoiled by too deep Inciſions.

Divide the Tunicle or *Involucrum* of theſe Muſcles, by making an oblong Inciſion near the *Umbilicus*, and ſeparate it above; which Operation would be very eaſy, were it not for the tranverſe Enervations of the *Muſculi Recti*, which adhere ſo very cloſe to the Tendons already mentioned; therefore you are to proceed with Care, in order to ſeparate them with a ſharp *Myrtle Knife*. When this Tunicle is taken off, draw the Muſcle aſide with your Left Hand, and carefully ſeparate it from the *Cartilago Xiphoides*, for fear of hurting the Mammary Veins in that Place. Afterward take off, by degrees, the inferior Part of this Coat, but take Care not to hurt the Nerves and Veins coming from the *Peritonæum* to theſe Muſcles. You will here meet with one of the niceſt Maſter-pieces of Nature in the Diſtribution of theſe Veſſels; for from the inferior Part come the Hypogaſtrick Veins, which ſend here and there ſeveral viſible Branches along this Muſcle. Theſe Branches, as is commonly ſuppoſed, do not unite with the Mammary Veſſels by Anaſtomoſes, but terminate in ſeveral ſmall Twigs before they approach theſe Veins. When theſe Muſcles are to be diſſected, firſt cut away the Veſſels, then ſeparate the Muſcles at their Origine from the anterior Part of the *Os Pubis*, and turn them down upon the Thighs.

V. MUSCULI *Tranſverſales.*

To raiſe the Tranverſe Muſcles requires a quick ſight, ſteady Hand, and a ſharp Knife well directed, on account of cutting the *Peritonæum*, which is a very thin Membrane, cloſely adhering to this Muſcle; wherefore Labour, Time, and Patience are required; for if you are too quick in the Operation, this Membrane will immediately be perforated by the Point of the Knife only touching it. You will find it much more difficult to begin and ſeparate this Muſcle from its Inſertion, than from its Origine. According to the latter, you are thus to proceed: I mentioned in diſſecting the Oblique Deſcending Muſcle, that an Inciſion muſt be made to reach the nervous Body, which is the Beginning or Origine of the tranverſe Muſcle. Theſe nervous Fibres lying directly toward the *Umbilicus*, muſt be croſſed by two ſmall Sections; hence the ſubjacent Fat covered with a ſlender Membrane, will thruſt itſelf up, which is to be kept under; fix a ſmall Hook in the Beginning of the Muſcle, and raiſe it; then with the Point of the Knife ſeparate it from the *Peritonæum*, rather breaking than cutting the Fibres. When you have got over the *Corpus Nervoſum*, put your Finger under the fleſhy Origine of the Muſcle, near the Cartilages of the falſe Ribs; ſeparate it from the *Peritonæum*, and above your Finger cut off the Muſcle; becauſe near the *Cartilago Enſiformis*, they are narrow: Deſire one of the By-ſtanders to put the Ribs as much as poſſibly he can upwards, that the Operation may be more eaſily performed. Having thus freed it from the Cartilages, it muſt be in like Manner freed from the Spine of the *Oſilium*, and the remaining Part may be ſo ſeparated from the *Peritonæum* as its nervous Beginning was; but this muſt be done with Care, for in that Place it ſends off a broad thin Tendon, or a fine nervous Subſtance, and the *Peritonæum* ſo cloſely adhering, that it can ſcarce be ſeparated from it.

If you proceed the contrary Method, you muſt begin with a gentle Section near the

Linea Alba, where the Tendon of this Muſcle takes it Origine; which repeat till you ſee the Tendon gradually leave the *Peritonæum*. Make the Section Longitudinally along the *Abdomen*, then fix a ſmall Hook into the Tendon to elevate it, and ſeparate it from the *Peritonæum*; but you are to turn the Edge of your Knife towards the Muſcle to be diſſected, and the Back towards the *Peritonæum*.

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CHAP. III.

Of the PERITONÆUM *and* OMENTUM.

I. *The* PERITONÆUM.

RAISE the *Umbilicus* by taking hold of the Thread, perforate the *Peritonæum* on each Side, then put a diſſecting Knife with the Point upward into the Hole toward the Loins, and repeat the ſame Operation on the other Side, taking Care not to hurt the Inteſtines, which, if the Belly is ſwelled, will burſt out with a violent Force.

Having folded theſe back in the ſame Manner, cut the upper Part of the *Peritonæum* towards the *Cartilago Xiphoides*; and in the Left Side, having thruſt the Knife through the ſuperior and lateral Inciſion, ſeparate a fourth Part thereof, and lay it back upon the Breaſt: Afterward lift up with your Hand or a Hook the other ſuperior Part of the *Peritonæum*, and with a Knife ſeparate that Part of the umbilical Vein adhering to its Inſide. This done, cut the *Peritonæum* near the *Umbilicus*, and turn it down upon the Breaſt. Having now removed one Half of the *Peritonæum*, the other half muſt be divided into two by an oblong Section, reaching the *Os Pubis*; but while this Inciſion is making, Care muſt be taken not to hurt the *Urachus*; therefore put your Hand under the *Peritonæum*, find out its Situation, then you will diſcover the proper Place for making your Section. Having drawn the *Peritonæum* a little back, ſeparate from it the *Urachus* and Umbilical Arteries, as you did the Umbilical Vein; afterwards cut off the *Peritonæum* at the *Umbilicus*, and lay it back upon the Sides. * You muſt not here neglect the Duplicature of the *Peritonæum*, which you may plainly obſerve in the *Pelvis*, wherein are contained the Bladder of Urine, the Kidneys, the two Lateral Proceſſes, the Spermatick Veſſels, and Teſticles in Men, and the round Ligaments of the Womb in Women, *&c.* Before you proceed farther, the *Umbilicus*, which hinders the Operation, muſt be removed; therefore cut off the *Urachus*, with the Umbilical Arteries near the *Umbilicus*, and fold them back upon the Sides, and place the Navel with the Umbilical Vein adhering to it upon the Liver.

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* Anatomiſts commonly cut through the *Peritonæum* with a Pair of Sciſſars. While you are diſſecting the Membrane, I would have you obſerve its Duplicature, in which are chief-

II. *The* OMENTUM.

The *Epiploon*, or Caul, being a double Membrane, appears next; which if you have a Mind to ſee, cut off any of thoſe Membranes you pleaſe, but eſpecially where it adheres to the *Colon*, and put your Hand or a Hook into the Inciſion; and there between its Duplicature, if you incline to ſeparate this Membrane, begin at the right Side whereon the

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ly placed the urinary Veſſels; likewiſe its ſeveral Proceſſes, eſpecially thoſe which ſerve to envelope the ſpermatick Veſſels in Men, and the Reind Ligaments of the Womb in Women.

Extremity may be come at, and proceed to the left; then cut off the *Omentum* from the *Colon*. When you are come to the Stomach, you may cut it out if empty; for if full, it will ſhew itſelf above the reſt; then you may ſeparate the *Omentum* without hurting the Coronary Veins of the Stomach; and when thus freed, take it entirely out.

The Inteſtines appear now naked with the Stomach, whoſe natural Situation you may take a View of before you ſet about this Adminiſtration.

CHAP. IV.

Of the STOMACH, INTESTINES, *and* MESENTERY.

ANATOMISTS commonly take out the *Stomach*, *Inteſtines*, and *Meſentery*, at one Operation, which is thus performed: Place yourſelf on the Right Side of the Body, and turning the ſmall Guts from the left to the right, free the *Colon* from the *Peritonæum* with the ſubjacent Membrane to which it adheres; then in like Manner ſeparate the *Spleen* from the *Peritonæum*, taking Care not to lacerate its thin Coat. Thus you will come at the Stomach and its upper Orifice, where it unites with the *Oeſophagus*: But becauſe it lies very deep to the *Vertebræ*, you muſt lay under the Body near the Stomach a Log of Wood, or a Brick, to elevate the Region of the Stomach above the Breaſt and lower Parts; then ſlide your Left-hand gently betwixt the Stomach and the left *Hypochondrium*, and with your Finger ſeparate the ſmall Membranes lying between the *Oeſophagus* and the *Peritonæum*; afterward fold it round your Middle and Ring-finger, and pull it ſo far forward as to be able to tye a firm double Ligature; then cut through the *Oeſophagus* in the Middle between the two Ligatures. This Inciſion being made, raiſe up that Orifice of the Stomach which is cut off, and below ſeparate it from the *Peritonæum*. Turn next to the left Side, and having thruſt back the Stomach and Inteſtines in their Places, ſeparate in the right Side under the Liver the *Colon* from the *Peritonæum*, where it is join'd to the Gall Bladder, by which it is tinged with a yela yellow Colour: It likewiſe joins the Kidney, and is faſtened to its *Tunica Adipoſa* by ſlender Fibrils, which are only carefully to be lopped off, leſt you hurt the *Capſulæ Atrabilariæ.* You now come to the *Duodenum*, wherein is inſerted the *Ductus Choledochus*, on which make a Ligature towards the Liver, and cut it off towards the Inteſtines. Search for the *Vena Porta* in the Concavity of the Liver, and when ſeparated of its Fat, cut it off.

Do the ſame to the Meſenteric Arteries, and thus the Meſentery, with the Inteſtines, will be almoſt ſeparated, and may be taken out with the *Stomach* and *Spleen*. What remains now to be extracted is only the *Inteſtinum Rectum*, lying in the *Pelvis*; therefore put your Hand into the *Pelvis*, take hold of the Gut with your Fingers, and puſh the *Fæces* upward till you have Room to make a Ligature thereon, which muſt be done in two Places; then cut the Inteſtine through between the Ligatures. It would be more proper to pull out the whole Inteſtine, and not a Part; but it has ſuch a cloſs Connexion with the circumjacent Parts, that it is almoſt impoſſible to ſeparate it without bringing them along with it; beſides, the ſmall Aperture betwixt the Legs, where the

Anatomiſt ſtands, and the large Quantity of Fat, are a great Hindrance to this Operation.

The *Inteſtines*, *Spleen*, *Pancreas*, *Stomach*, and *Meſentery*, being altogether extracted from the Body, you are next to ſeparate them from one another; therefore take off firſt the *Spleen*, with its ſplenic Branches, and place them ſo on a Table, that Part of the *Pancreas*, to which the ſplenic Vein and Artery adhere, may ly uppermoſt; then ſeparate theſe with the Knife, by making Inciſions longitudinal in the *Pancreas*, make a Ligature in each of the ſeparated Branches, and cut them off. Find out the Inſertion of the *Vas Breve* into the *Stomach*; and after making a Ligature thereon, cut it, and ſeparate the *Spleen* for a further Preparation. The *Pancreas* ſhould next be removed; but becauſe we cannot ſee the Entrance of its Duct without opening the *Duodenum*, therefore it muſt be ſo ſeparated from its Membranes, as to cohere with this Inteſtine.

The Inteſtines in all Demonſtrations being laid on a Table, and expoſed to View, ſhould be cleaned, and afterwards inflated. The firſt Operation is performed by adapting a

Funnel to the Orifice of the Stomach, through which pour a certain Quantity of Water, till it finds its Exit at the *Colon*. You cannot pour the Water in at the *Inteſtinum Rectum*, becauſe Wind that Way cannot get beyond the *Colon*, much leſs Water.

The ſecond Operation is performed, firſt, by making a Ligature upon the lower Extremity of the Guts, then fixing the Mouth of a Pair of Bellows into the Orifice of the Stomach, by firmly tying a Thread round it, and inflating the whole Inteſtines.

In pulling out the Inteſtines, you may obſerve their Membranes or Coats, whereof *Galen* mentions only two, not taking Notice of the firſt, *viz.* That ariſing from the *Peritonæum*, which our modern Anatomiſts do, but with this Difference, call it the common, and the other two the proper Coats. You may after the following Manner find out their three Coats. The ſmall Membranes you before obſerved to ſhrink in, ſeparating the *Meſentery*, take up with your Nails, and you will ſeparate the firſt Coat, that takes its Origine from the *Peritonæum*. This Coat being removed, make here an angular Inciſion; then raiſe that diſſected Coat, and ſcrape it off from the ſubjacent, *viz.* The third Coat, covered on the Inſide with a mucous Cruſt, to ſee which make a longitudinal Section in the Inteſtine.

Before you enter upon the Stomach, you may obſerve the *Cæcum* with the Valve which divides the great Guts from the ſmall; but you will have a better View of theſe, if you cut off about four Inches of the *Inteſtinum, Colon* and *Ilion*; for the *Colon* adheres externally, but the Valve lies within. To have a clear Idea of the Strength of this Valve and Situation, pour Water into the *Colon*, which will not run out at the oppoſite Part, except the Valve be very flacid; but if poured into the *Ilion*, it immediately runs through. Having poured out the Water, divide the Inteſtine longitudinally, and you will more plainly obſerve the Valve. Having taken a View of this Valve, paſs next to the *Cæcum*, which adheres to the *Colon* near the ſame Place, and is very ſmall in reſpect of the other Inteſtines *. Find out its Entrance with a Probe, and ſee whether it is a double Paſſage, as ſome Anatomiſts affirm; * or a ſingle one, as I have always obſerved. You will find it larger in Infants in Proportion to the Magnitude of their Bellies, than in Adults, and full of Excrements. †

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* Our Author ſays, in *Lib.* III. *Obj.* 21. That he once found in an Infant the *Cæcum* three Times larger than the *Colon*. If ever he did find it of this Magnitude, he is the only one that can boaſt of ſuch an Obſervation.

Having done with the Guts, we now come to the Stomach, whoſe Coats you are to ſeparate as you did thoſe of the Inteſtines; afterwards take Notice of the Gaſtric Veins creeping along its Bottom, then with a Knife open its Orifices, to obſerve ſome fleſhy Fibres in the ſuperior, or left Orifice, and a thick fleſhy carnous Circle like a Sphincter, ſurrounding the Inſide of the inferior, or right Orifice, termed the *Pylorus.*

But in the Method of diſſecting the Stomach, many Parts are cut off, which would be of Service if kept on; it would therefore be much better to begin from the *Jejunum*, and firſt cut off the Inteſtines only, as *Riolan* obſerves. But in this Adminiſtration the following Order muſt be obſerved. Having ſeparated the *Colon* on the right Side, thruſt it toward the left, that you may come at the *Duodenum*; there find out the biliary Duct, and tying the Gut above and below the Duct, cut it aſunder between the Ligatures; afterward take hold of the Inteſtine, and gently touching the Meſentery, ſeparate its upper Membrane, which leaving the Inteſtine clear, will point out the Place where the other Membrane is to be perforated, *viz.* Next to the Inteſtine. In this Operation, you are to continue both in the upper and lower Membrane, till you come to the *Inteſtinum Rectum*, which take out, as above directed.

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* I imagine that theſe Gentlemen were much more employed in the Diſſection of Brutes than of Human Bodies, and as they found it ſo in the former, they therefore took it upon Credit that it muſt be ſo in the latter.

† *Albertus* and *Bartholin* found this Inteſtine miſſing in ſome Bodies.

Fernelli obſerves the ſame Method in taking out the Inteſtines, but with this Difference, that he begins from the *Rectum*; but he makes two Ligatures on the *Jejunum*, and cuts it aſunder between the Ligatures, before it runs under the *Vena Porta*, that he may remove at Pleaſure from Place to Place the Inteſtines.

Some inject Water into the Stomach by the Mouth, before taken out, to make it ſhew its natural Situation the better; but this may be left to every one's Fancy. The Inteſtines being extracted, there remains now in the Body the *Ventricle*, *Spleen*, *Pancreas*, and the *Meſentery*, which may be all at once taken out in the ſame Manner as above directed. But if you follow this Method, I would adviſe you to pull out the *Oeſophagus* and Stomach, together with the *Liver*, *Spleen*, *Pancreas*, and *Meſentery*; however, Anatomiſts ſeldom uſe this laſt Method. I have likewiſe added the following Obſervations, if you have a Mind to trace the Nerves that come from the Stomach. The common Method is as follows. The *Thorax* muſt be firſt opened, and its *Viſcera* taken out; but take Care not to eradicate the Nerves of the ſixth Conjugation, then the Diaphragm to the Paſſage of the *Oeſophagus*, but do not touch the abovementioned Nerves; paſſing the ſame Way afterward, cut with the Myrtle knife theſe Membranes which connect the *Oeſophagus* to the *Aſpera Arteria*, to free it from thoſe Parts in the *Thorax* whereto it is joined. Next Cut off the Nerve deſcending with the Stomach, at its Origine, and thruſt the *Oeſophagus* downward, by an Inciſion made in the *Septum Tranſverſum* to the *Abdomen*. The Liver muſt now be ſeparated from the Diaphragm, as ſhall be ſhewn hereafter, and removed to the left Side of the Abdomen, after having made a Ligature upon the Trunk of the deſcending *Cava*, then ſeparate the Meſenteric Arteries, and having made Ligatures thereon, cut them off. The other Parts are ſeparated in like Manner as the Stomach, Spleen, and *Pancreas*.

The Parts thus extracted being laid on a Table, firſt ſeparate the Meſentery Veſſels from the Fat, till you come to the Origine of the Splenic Veſſels; having made a Ligature thereon, cut off the remaining Part of the Meſentery, and lay it in one Side; the other Parts you may thus place on the Table; the Liver lay on its convex Part to the right, the Spleen to the left, and the Stomach in the Middle, with the Pancreas above it. Having thus placed them, clear the biliary Duct from the Fat, that you may ſee its Progreſs and Entrance into the *Duodenum*, in like Manner the Splenic Branches, both Vein and Artery of their Fat and Membranes, then the *Vas Breve*, which joins the Stomach with the Spleen; next to this, take the Stomach in your Hand, and beginning at the Top, ſeparate the Nerve of the ſixth Pair, proceeding to the Stomach, and taking off the Membranes, unfold the *Plexus Nervorum*, where you may obſerve a fine and beautiful Contrivance of Nature in the Diſtribution of theſe Veſſels; afterwards ſeparate the Muſcles of the *Oeſòphagus*. The *Uvula* is joined to the *Oeſòphagus* by its Muſcles, which cut off. You need not fear hurting the Muſcles, that cannot be, becauſe they run below, along the Sides of the *Oeſòphagus*.

The *Oeſòphagus* has a great many Muſcles, but the largeſt is the Sphincter, which ſhutting its Orifice, and ſurrounding it, is eaſily diſtinguiſhed from the reſt by the Direction of its Fibres; the other Muſcles lying very cloſe together, and differing very little from the direct Situation of their Fibres, are difficult to be diſtinguiſhed. The ſmalleſt Muſcle called *Stylopharyngæus*, is on both Sides ſituate next to the Sphincter; the ſecond, being broader, and denominated *Sphænopharyngæus*, is joined to the Inſertion of the former Muſcle, but is ſomewhat diſtant from it at its Origine; the third termed *Cephalopharyngæus*, is the broadeſt Muſcle, and is ſituated in the poſterior Part. Each of theſe three Muſcles are placed on both Sides of the *Oeſophagus*, and therefore make three Pair. How far they are to be ſeparated, will eaſily appear from what has been ſaid.

We muſt, in this Section, treat of the Meſentery, becauſe it is joined with the Inteſtines, and keep them in their regular Order; in it you are to obſerve Veſſels, Membranes, Glands, and Fat; the Fat is ſometimes in ſo large a Quantity, that you can ſcarce diſcover its Veſſels, but more particularly the Lacteals. Some ſmall Glands are alſo interſperſed upon the Meſentery; the largeſt of which is ſituate near the greateſt of the *Vena Porta*, affording the Lacteals a ſafe Paſſage, and is by *Aſilius* called the *Pancreas*, which has occaſioned a Miſtake to many. Theſe Glands are never, or very rare diſſected, but only the greater are opened to ſee their containing Fluids. The Meſentery has a double Membrane from the *Peritonæum*; to find out this Duplicature, make an Inciſion into either Membrane, and pull it off with your Fingers towards the Inteſtines, which will eaſily follow, and give a full View of the ſubjacent Glands and Fat; on the oppoſite Side, you will find the other Membrane intire.

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The Meſentery is furniſhed with Veſſels of every Kind, but the Veins and Arteries are not conſpicuous; and in living Creatures, or thoſe immediately choaked after feeding the Lacteals, theſe Veſſels are diſtinguiſhed from each other by their Colour. The Veins ſeem livid, on account of the Tranſparency of the Blood; the Arteries being now empty, appear whitiſh or yellowiſh; but the Lacteals, if full, are perfectly white, if empty, inviſible; however, more of this in the next Chapter.

The more curious ſometimes ſeparate the Meſenteric Veſſels from the Membranes, Fat, and Glands, in order to ſhew the Diſtribution of theſe Veſſels; In proſecuting this Method, they begin at the *Vena Porta*, and take off all the Membranes of either Side, which may be done with the Nails, then in like Manner the Membrane of the other Side.

The Membranes being now removed, you are with a Knife to ſeparate the large Veſſels from the Fat, till you come to the ſmall ones, where the Operation is both tedious and troubleſome, on account of the vaſt Quantity of capillary Veſſels. To prevent this Difficulty, expand the Meſentery on a Table, and ſqueeze the Fat with the Back of your Knife toward the Extremities, and thus you will eaſily clear your Meſentery of all its pinguous Subſtance, then work the Veins with warm Water.

CHAP. V.

Of the LACTEALS.

AS to the Lacteals, we muſt obſerve in particular, that the Diſcovery of theſe Veſſels is ſcarce ever to be made in one and the ſame Body, where you intend a perfect Diſſection of the other Parts, becauſe many Reaſons may be given why theſe Veſſels cannot remain viſible for any conſiderable Time after Death; therefore ſoon diſappear, and eſpecially the Meſenteric Lacteals, when expoſed to the Air.

Hence there muſt be two Operations of thoſe Veſſels, one which treats of ſeparating only the Lacteals, without minding the other Parts, another which manages them with the other Parts.

The firſt of theſe is accurately handled by *Th. Bartholine* in his Anatomical Hiſtory of the Thoraic Lacteals, to which I refer you; the latter I ſhall here briefly explain.

Having carefully opened the exterior Parts of the *Abdomen*, turn to the *Omentum* lying upon the Intrails upward; then, puſhing the ſmall Guts out of their Places, obſerve whether you can ſee ſmall white Canals on the Surface of the Meſentery, which are *Aſſellius*'s Lacteals; if they do not appear after a very ſtrict Search, it muſt be either imputed to long faſting before Death, or your Delay in not immediately ſeparating the external Parts after Death. If thoſe Veſſels appear, throwing aſide the Inteſtines, ſeek for the Meſenteric Gland, where the *Vena Porta* divides itſelf into a great many Ramifications; you will meet with a Confluence of Lacteals, which go to the Lumbar Glands.

It is enough to take a tranſient View of them here. You then proceed to the Adminiſtration of the Inteſtines, Stomach, and Liver, and the remaining *Viſcera* in the lower er Belly, as ſhall be ſhewn in its proper Place.

After this, you enter upon the Anatomy of the *Thorax* in the uſual Way, as ſhewn in Book II. and lay bare the Spine of the Back: But, in opening the vital Organs, two Things muſt be conſidered. 1. To make a Ligature on the left Subclavian Vein, immediately after its Origine out of the Trunk. 2. In ſeparating the *Aorta*, the Fat lying under, and ſerving as a Pillow or Cuſhion for this Veſſel to reſt upon, muſt be left untouched all along the Spine, becauſe the *Thorax* is inveloped in it.

If the Spine be laid bare, you muſt make an Inciſion into the Diaphragm, and carefully divide its Proceſſes, eſpecially the right one, from the Lumbar *Vertebræ*, becauſe under it lies the Lacteal Branch, which aſcends to the *Thorax*; then find out the Lacteal Vein after the following Manner. If there are ſtill ſmall Glands, pull them gently, and you will eaſily find the Paſſage of the Veſſels; but if quite obliterated, you need not deſpair, but only clear the Spinal *Vertebræ* of their Fat with the Point of the Knife, and then you will infallibly find the Veſſel, which

Veſſel raiſe with your Hand, or a Hook, and proceeding upward, ſeparate it above from the Fat, and below from the Spine; but you muſt be very careful near the *Claviculæ*, becauſe there it divides itſelf into ſeveral Branches.

Therefore, to diſcern theſe minute Ramifications nicely, make a longitudinal Inciſion into the inferior Parts of the Veſſel, in which put a ſlender Tube, then preſſing the Veſſel tight with your Fingers round the Tube, deſire a By-ſtander to blow in, and you will eaſily ſee in what Place the Inciſion is to be made, likewiſe plainly perceive whether it enters the Subclavian by one, two, or three Branches, afterward cut off the Fat, where you obſerve the greateſt Commotion.

If the Inſertion of this Canal be only ſingle, you may eaſily obſerve the Situation of its Valve; thus make a Ligature on the Extremities of the Jugilar and Axilary Veins, to prevent the Inconvenience of the iſſuing from thence; then make a longitudinal Inciſion in the Axilary Vein, and inject it with Air or Water through a Tube, where you obſerve a Motion to be ſtrongeſt, there the

Inſertion is, and a very thin Membrane which ſupplies the Place of the Valve, to ſtop the returning Fluids, which you will eaſily perceive, if you narrowly inſpect the Subclavian Vein.

CHAP. VI.

MANCHES MEDI

Of the PANCREAS *and* SPLEEN.

I. *The* PANCREAS.

THE *Verſungian Duct*, on whoſe Account the Adminiſtration of the *Pancreas* is undertaken, terminates in the *Inteſtinum Duodenum*; wherefore, if you have a Mind to ſee the Inſertion of this Canal, a Part of the *Duodenum* muſt be cut off from the reſt of the Inteſtines, otherwiſe you cannot trace the Inſertion of this Duct, which joining with the *Ductus Cholidochus*, enters this Inteſtine about two Inches below the *Pylorus*.

The *Pancreas* being laid on a Table, make a longitudinal Inciſion through the Middle of its Coat, afterward by going gradually deeper, ſcrape off the Pancreatick Subſtance with the Point of the Knife, but take Care not to go too deep leſt you hurt the Canal, if you obſerve a ſmall white Membrane in the Subſtance of the *Pancreas*, you may ſuppoſe it to be the external Coat of that Canal Duct, therefore follow it; both toward the Inteſtines it is broader, and toward the Spleen it grows narrower; but it ſends off ſmall Branches on both Sides like a Feather, which, if you would obſerve, you muſt ſcrape the glandulous Subſtance quite away till you come at them. You may find the Entrance of this Duct into the Inteſtines, either by injecting it with Air or Water; to do this, make a longitudinal Inciſion, fix a ſmall Tube in it, then inject either Air or Water by this Tube through the Canal, and where the Air or Water come into the *Duodenum*, that is the Place of this Canal's Inſertion into that Gut.

You can ſcarce enter it by a Probe or Tube in the Inſide of the *Duodenum*, becauſe it is there furniſhed with a thick membranous Circle, to prevent the Chyle and Excrements, while paſſing along the *Duodenum*, from entring here. If you blow in at the other Extremity, you will be ſenſible of theſe Valves which oppoſe the Air's Ingreſs into the Capillary Veſſels.

The Splenick Veſſels adhere to the lower Side of the *Pancreas*, which ſhould be ſeparated at the ſame Time with the Inteſtines, as above directed; but if they ſtill adhere, you muſt ſeparate them, to examine further into the Spleen.

II. *The* SPLEEN.

The Method of taking the Spleen out of the Body has been already exhibited, therefore a Repetition would be to no Purpoſe, In taking out the Spleen, we are to look into its Veſſels, Membranes, and the *Parenchyma*. The greateſt Difficulty in this Operation, conſiſts in removing the Fat plentifully ſurrounding the Veſſels; therefore you muſt take Care in ſeparating it. To do this, a Probe or Stick muſt be gently introduced into theſe Veſſels; therefore you muſt take Care, in ſeparating it, not to hurt the Veſſels, that ſo being rendred bigger and larger, they will be viſible. You muſt obſerve, that thoſe Veſſels do not always enter the Spleen by one Branch, but ſometimes by two, and ſometimes by three. You are not here to paſs by the *Vas Breve*, which generally approaches the Stomach by one Branch; yet Nature ſeems ſometimes luxuriant here as in other Places, For I have obſerved, in the diſſecting of the Spleen of a ſplenetick Perſon, three large viſible Branches. If you have a mind to ſhew its Membrane, make a very light angular Inciſion, then lift up the Membrane with a Hook, or you may take it off with the Point of a Knife as you think convenient. Sometimes it comes off as ſoon as touched, as it did in the Spleen, whoſe Coat was ſo very thick, that it could be ſo ſeparated with the Back of the Knife. The Membrane being taken off, what remains is the *Parenchyma*, joined with the Veſſels; but the Method of ſeparating them, we ſhall ſhow in the End of the next Chapter.

CHAP. VII.

Of the LIVER.

THE Separation of the Liver is the moſt difficult Operation of any, by reaſon of its near and cloſe Connection with the *Septum Tranſverſum* by the *Cava*, which will ſcarce admit of a Ligature, therefore the Operation ſhould only be undertaken by an able Hand. *Fernelius*, on account of its Union with the ſuperior Parts, thinks it can neither be ſeparated, nor taken out of the Body; but that this Difficulty may, in ſome Meaſure, be removed, put ſomething under the Back, near the Region of the Liver, as has been already directed concerning the Stomach, in order to raiſe it, and make it hang, ſloping toward the *Os Pubis*, but let the *Viſcera* of the middle Cavity incline toward the Neck; then have a lighted Wax-candle, to ſee what you are doing; becauſe your Hand being in the Light, will obſtruct your Operation. Having now prepared every

Thing, next enter upon your Diſſection. *Firſt*, with the Palm of your Hand, depreſs the Liver, and cut off with a Knife the *Ligamentum Suſpenſorium Hepatis*, afterward take hold of the Knife by the Extremity of its Handle, that it may enter deeper, becauſe it muſt penetrate the *Cava*, which is ſituate very low, and the ſmall Membranes, with the Fibres, muſt be removed, till the livid Colour of the Blood appears through the *Cava*, which, when perceived, you muſt ſtop here; beginning on the right Side, preſs the Liver as much as poſſible to the left, or you may turn the Body to the left Side, and, in like Manner before directed, cut off the connecting Fibres, or ſeparate, by the Way of Execration, till you ſee the *Cava*. Likewiſe, thruſt your Finger under the *Cava*, but without hurting its Trunk, till you find a Paſſage to the other Side, on which make a tight Ligature. After having carefully ſtript the deſcending Trunk of its Membranes, and made a Ligature above the Emulgents, cut off, on both Sides, the *Cava* near the Liver, and then you may take it out, being now quite free, without Difficulty.

After extracting the Liver, the Membrane muſt be demonſtrated. Make a very gentle angular Inciſion in this Membrane, afterward ſeparate it with the Handle of your Knife, as you did the Splenic Membrane.

We are next to obſerve the Liver, the Gall, Bladder, and Biliary Duct; but as I mentioned in the laſt Section, a Part of the *Duodenum* muſt be left in the Body to trace their Inſertion; therefore having cleared the *Ductus Cholidochus* of its Fat, ſeparate the *Veſcicula Fellis* a little, that you may obſerve the Paſſages which go thither from the Liver. Then lay the Liver on a Table, with its concave Part uppermoſt, and deſire a By-ſtander to keep it immoveable with both his Hands; afterward thruſt your fore and middle Fingers, being a little ſeparated, into its Bottom, pull off the Membrane from the Liver, and with the Point of a Knife ſeparate the interveening Fibres that tend this Way, till you ſee the minute Veſſels here and there entring the Subſtance of the Liver, which muſt be carefully preſerved. Near the Bottom, you commonly meet with a large Veſſel; if you deſire to ſee the Place of Inſertion, having opened and cleaned the *Duodenum*

odenum, ſqueeze the *Cyſtis Fellea*, and obſerve where the Bile iſſues out, or having opened the Duct, trace its Paſſage with a Probe or Tube, which lies very near the Pancreatick Duct, and ſometimes acts the Inteſtines by the ſame Paſſage. You are alſo to take Notice of the Veſſels belonging to the Liver, by tracing their Entrance into its Subſtance with a Probe. It now remains to ſay ſomething concerning the Separation of theſe Veſſels from the *Parenchyma*, before I proceed farther.

This Operation is performed either in a boiled or in a raw Liver, according to Pleaſure. If a raw one, ſcrape off the *Parenchyma* with a wooden Knife. The Operation may be more eaſily performed, if you will let the Liver macerate a few Days in Water, or not touch it till it begins to putrify ; but becauſe every Part cannot be taken away at once, you may macerate the Liver for an Hour or two in the ſtrongeſt Vinegar, afterwards take it out, and repeat your Operation with a wooden Knife, till the whole *Parenchyma* is taken off. I have found this Operation ſucceed beſt in the Liver of Brutes.

They who perform the Operation in a boiled Liver thus proceed; firſt, they boil it for ſome Time in Water, then take it out of the Water, and beat it with a Stick, till the *Parenchyma* comes off, and the Veſſels appear bare. If the *Parenchyma* ſtill adheres cloſe to the Veſſels, you are to macerate it in Vinegar as above directed, then beat it again. Some bury a boiled Liver into an Ant's Neſt, which eat the *Parenchyma*, and leave the Veſſels untouched. If you put the Veſſels, when ſeparated, into clear Water, you will have a fine Idea of all their beautiful Ramifications and capillary Extremities, ſwimming on its Surface.

What has been ſaid of the Liver may be applied to the Spleen, in order to ſeparate its *Parenchyma* from the Veſſels, therefore I will uſe no Repetitions here.

CHAP. VIII.

Of the MUSCLES *of the* ANUS, PENIS, *and* VESICA URINARIA.

BEGIN from the Skin, and make a ſtreight Inciſion along the Yard, which, when laid bare, you will obſerve the *Vena Pudenda* running along, and ſending forth Branches to the external Coat of the *Teſtes*; having ſeparated the Skin from the *Penis*, cut it off near the Glans, then raiſe the Skin of the *Scrotum* with the *Membrana Carnoſa*, which adheres here and there to it; afterwards pull back the *Teſtes*, and ſeparate the Fibres cloſely adhering to them; but take care you do not touch them with the Knife; the Cremaſter Muſcles are very ſmall, and run along the Outſide of the *Tunica Vaginalis*. The *Teſtes* being ſeparated from the *Scrotum*, lay them in the *Abdomen* for farther Operation. Having opened the Legs, make an Inciſion in the Skin on either Side, in the internal *Part* of the *Femur*, to the *Podex*, about which make a deep circular Section in the uſual Manner, that you may ſee the Fat about a Hands-breadth in both Thighs. But to eaſe yourſelf in this, and prevent your too much ſtooping, lay a Brick under the Buttocks, then turning the *Penis* upward out of the Way, begin with taking off the Fat, which muſt be very carefully done, leſt you hurt the Muſcles involved in it; begin at the anterior Parts, having ſeparated the Membranes and Fat, and proceed toward the poſterior. The firſt you then meet with is the *Corpora Nervoſa* of the *Penis*, ariſing from the *Oſſa Pubis*; next, its Muſcles lying under them, then the *Sphincter Ani* ſurrounding the *Inteſtinum Rectum*, which takes its Origine from the *Os Coccygis.* If you rightly underſtand theſe, you may eaſily know after what Manner they are to be diſſected, *viz.* Firſt by making longitudinal, then circular Sections, and taking off the Fat all round the Fundament. If you have ſeparated the Fat till the Muſcles plainly appear, thruſt your Finger into the *Anus*, and pull it out to ſee the *Levatores Ani* placed on its Sides. If you cannot obſerve them, they muſt be reſerved till you have taken out the other Parts, according to *Galen*'s Method, who thinks theſe Muſcles cannot be ſeen, unleſs the Inteſtines are firſt taken out, and the *Oſſa Pubis* ſeparated.

Afterward ſeparate the Muſcles of the *Penis*; firſt the ſuperior, ariſing from the Sphincter *Ani*, ſuperior Part of the *Urethra*, the *Os Iſchium*, and the *Oſſa Pubis*, called by *Riolan*, *Acceleratores*, and cut them off at their Origine. Then cut off the Origine of the *Erectores Penis*, or ſecond Pair, from between the Tubercle of the *Iſchium*, and beginning of the *Corpus Cavernoſum*, alſo from the whole *Sphincter Ani*; next, ſeparate a Part of theſe Muſcles from the *Urethra*, to come at the *Sphincter Veſicæ*, which is only a few ſmall circular fleſhy Fibres, placed under the external Coat of the Bladder round its neck, and ſerving to ſhut it; the Demonſtration whereof is ſo eaſy, that we need not lay down Rules for its Adminiſtration.

MANCHESTER MEDICAL

CHAP. IX.

Of the Method of extracting the SPERMATICK *and* URINARY *Parts.*

YOU now begin with the Spermatick Veſſels, which I deſired in the preceding Chapter to be reſerved in the *Abdomen* with the *Teſtes*, and, following their Canal, clear them from their Membranes toward their Origine; whether it be the Trunk, or the Emulgents; for Nature is not always the ſame here. The Ureters ly under the Spermatick Veſſels, which are joined to them as they paſs the *Peritonæum*: After having thruſt back the Ureters, take out the Kidneys; while you are extracting the right, you place yourſelf on the left Side of the Subject, and while extracting the left, on the right. You will have here little Occaſion for a Knife, becauſe they are only joined to the Loins by ſome ſlender Fibres. But while you are extracting the Kidneys, leſt you ſhould forget the *Glandulæ Succentu-*

riatæ, placed above, and adhering to the Kidneys, near the Spine, you may take them out with the Kidneys, and reſerve them for their Preparation. You are alſo to divide the *Vena Cava* from the *Aorta*, that lying a little under it, after having made two Ligatures, then cut it aſunder, and take both out, but take Care while you are ſeparating the Fat, that you do not take along with it the ſubjacent lacteal Branch. Theſe Things being done, you are next to make two Ligatures on each iliac Branch deſcending to the Legs, then cut them aſunder between the Ligatures; afterward ſeparate the two Trunks of the *Vena Cava* and *Aorta* from the Lumbar *Vertebræ*, and from the ſuperior Parts, by beginning as was before directed: But leſt the pendulous Kidneys break their Veſſels, you muſt hold them with your Hand, then ſeparate the Lumbar Veins and Arteries ariſing from their Trunks. If you have Time, it will be neceſſary for you to make Ligatures on them firſt.

Having now come to the *Pelvis*, you are thus to take out its containing Parts; Firſt cut off the Ligaments, which faſtens the *Penis* to the Syntheſis of the *Oſſa Pubis*, ſeparate the *Corpora Nervoſa* of the *Penis*, and the *Muſculi Acceleratores* near the ſame Bones, and having pulled back the *Penis* toward the *Anus*, ſeparate every Part adhering internally to the *Oſſa Pubis*. You are alſo to divide the *Oſſa Pubis*, by cutting through the Cartilage uniting theſe Bones, either with a Sword-like, or thick back diſſecting Knife; but never attempt this Operation, till there is Room enough in the *Pelvis* for the Admiſſion of your Fore-finger *. You may, by Degrees, widen this Fiſſure made before, without diſtorting the Bones, ſo as to ſeparate from the *Os Sacrum*, according to *Galen*'s and *Fernelius*'s Opinion, leſt any one Part be bruiſed or broke. Through this Apperture put out the Spermatick Veſſels, Ureters, with the Kidneys, and ſeparate the *Peritonæum* from the Edges of the *Pelvis*; the reſt may be done by Excoriation; the Bladder and *Podex* may be exterminated through the former Hole, being a little enlarged, and the remaining Fat cut off at the Side, which ends this whole Operation. However, all this Time, you are to abſorb the Blood iſſuing out of the Veſſels with a Spunge, which would otherwiſe prove troubleſome during the Operation.

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* *Fernelius* made uſe of a blunt Razor and a leaden Mallet to cut through this Cartilage.

Having extracted theſe Parts, you are next to ſeparate the *Inteſtinum Rectum*, becauſe it has no Relation with any future Preparation. If you could not before ſee the Levatures, you may now clear them of their Fat, and take a View of them; but as for the Method of their Adminiſtration, no certain Rules can be preſcribed.

CHAP. X.

Of the Preparation of the KIDNEYS, RENAL-GLANDS, *and* BLADDER.

F*ERNELIUS*, treating of the Adminiſtration of the Kidneys, ſays, they are beſt to be done while remaining in, and adhering to the Body; for he, having made a Ligature on the emulgent Arteries and Veins, cuts them aſunder, then takes out the Kidneys, and diſſects them. However, I think it better to take out the Kidneys with the Spermatick Veſſels, and prepare them together; but how this Operation is to be performed, it is my Buſineſs to ſhew. Having cut off a Part of the *Inteſtinum Rectum*, and laid the other Parts on a Table in their natural Situation, begin afterward with the KIDNEYS. Make firſt an Inciſion in the *Tunica Adipoſa*, which alſo envelope the *Renes Succenturiati*, or *Capſulæ Atrabilariæ*, but take care not to cut off theſe with the Membranes, becauſe they pretty much reſemble Fat in Colour; therefore ſeparate them at their Beginning, with their Arteries and Veins, ariſing either from the Emulgents, or from the Trunks, and trace their Cavities with a Probe. After making a longitudinal Inciſion along the Kidneys, ſeparate the *Tunica Adipoſa*, and take it off by way of Excoriation; but the Veſſels near the Emulgents muſt be cleared of the Fat, to obſerve their Diſtribution and Progreſs. The ſecond, or proper Coat of the Kidneys, muſt be ſeparated from the *Parenchyma*, in the ſame Manner as you did the Splenick Membrane; but it is ſomewhat more difficult, on account of its cloſer Adheſion. When the Emulgent Vein is opened and probed, you will ſometimes ſee a ſingle Valve, ſometimes a double one, and ſometimes none at all. Take hold next of the Kidney in your Left-hand, in ſuch a Manner as to turn the Inſertions of the Veſſels toward the Palm of your Hand, and divide the ſuperior oppoſite Side in the Middle, by making an Inciſion with the Myrtle knife as deep as the Ureters. You will here ſee the papillary Caruncles and Tubes, through which the *Serum* is diſtilled into the Ureter, whoſe Beginning is the *Pelvis*.

You will here likewiſe obſerve the Ureters taking their Courſe from hence to the Bladder, encloſed by a Membrane from the *Peritonæum*, which you are thus to ſeparate. Take hold of the Head of the Ureter in your Left-hand, and let your Aſſiſtant hold the Bladder, ſo as to extend the Ureter; then introduce the diſſecting Knife between the Ureter and Membrane, toward the Bladder, ſo as to ſeparate the Tunic, which you may afterward pull off from the Ureter with your Hand.

In preparing the BLADDER, you are firſt with the Knife to ſeparate its external Coat from the *Peritonæum*, by beginning at the

Bottom, where you are to take care not to cut the *Urachus*. The URETERS under this Coat cut the Bladder near its Neck, but to ſee their Entrance, both the Bladder and Ureters muſt be laid open. Introduce into the Ureter a ſmall Probe or Tube, and if you inflate it, you will obſerve the Orifice opening within the Bladder, and the Wind or Water jetting as it were between two Conduits or ſmall Canals, which, when they cling together, prevent the Return of the *Serum*. You are alſo to take Notice of the SPHINCTER MUSCLE of the Bladder, ſituate before the Proſtate Glands, and eaſily diſcernible by its circular Fibres, when cleaned of its Membranes, therefore we need ſay no more of it.

CHAP. XI.

Of the Parts of GENERATION *in* MEN.

YOU are to begin with the Coats of the Teſticles, therefore make firſt an Inciſion in that Coat which is from the *Peritonæum*, and being joined to the Cremaſter Muſcle, incloſes the Teſticle, hence denominated, ερυτροειδης, or *Vaginalis*. After having made a longitudinal Inciſion in this Coat, firſt ſeparate it with the Knife from the Veſſels, and then from the Teſticles *. Having removed the Coat, you will ſee the VASA PRÆPARANTIA incloſed in a peculiar Coat, which muſt be taken off, to ſee the mutual *Anaſtomoſes* of their Veſſels. Therefore, after having ſpread this Coat with its Veſſels on a Table, make an Inciſion, but take care not to touch the ſmall Branches of the Veſſels; then, either with the ſharp

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* *Riolan* would have you tear off this Coat with your Fingers.

Point of a Knife, or with your Finger-nails, ſcrape, and take off as much as can be done. Separate next the Veins and Arteries, united by their Fibrils. To divide all theſe Branches, would be an endleſs Taſk; therefore it is enough to do it with ſome, or the great Part of them. However, near the Teſticles, theſe Anaſtomoſes are not ſo very numerous, but many of theſe Veſſels are interwoven with one another like the Twiſt of Vines, till they cut the *Paraſtatæ*, hence called *Corpus Pampiniforme*. Theſe Veſſels, when full of Blood, are more conſpicuous, and make a more beautiful Appearance than when empty. You need not ſpend much Time in preparing the *Paraſtatæ*, but only ſhew, that a very ſmall Part of them is only capable of being ſeparated from the Teſticle. But before you leave the Teſticles, I would have you take a View of their third Coat, which is almoſt impoſſible to be ſeparated from the Body of the Teſticle; as for the Subſtance of the Teſticle, it is eaſily diſcovered, by making an Inciſion therein.

VASA EJACULANTIA convey the *Semen* from the *Teſtes* to the *Veſiculæ Seminales*, which are in their Beginnings full of Windings and Twiſtings, hence denominated *Corpus Varicoſum* & χιρσοειδης; if the exterior Coat is removed, theſe Veſſels may be farther extended in Length. You ſee in their Progreſs a great many crooked and winding Veins adhering to their external Side, like thoſe in the Circumvolutions of the Brain, which muſt be ſeparated with their Membranes, or elſe they will intercept the Sight of the *Vas Deferens*; therefore theſe Veſſels muſt be cleared of their Membranes as far as their Extremities. Having removed theſe Impediments, you will here find with your Fingers the Situation of the Proſtate Glands adhering to the Backſide of the Neck of the Bladder. In the Middle, between theſe two Glands, make an Inciſion in the Membranes, where you will ſee a whitiſh Body, interſperſed with red Veins, and theſe are the *Proſtatæ*, which you are to clear of their Membranes, eſpecially on the Sides, where you will ſee the adjacent Seminal Bladders and Spermatick Veſſels. While clearing the *Veſiculæ*, or Bladders, of their Membranes, you will obſerve ſeveral ſmall Veins lying on them, by which they are, as it were, divided into ſo many ſmall Cells. They are joined to the *Vaſa Deferentia*, from whence they receive the Seed, and convey it into the *Urethra*. To ſee how this is done, open the *Vas Deferens*, and inflate it with a Tube, then you will obſerve the *Veſiculæ* ſwell, and ſoon after diſcharge themſelves into the *Urethra*; that you may ſee the Place, open the *Urethra*, and you will obſerve the ſmall Point of it ſwelled, likewiſe feel the Air coming through a very ſmall Hole; for it is a very ſmall Opening in the *Urethra* that affords the Seed a Paſſage.

The PENIS, belonging only to the Male, and deſigned for the Sake of Generation, remains next to be examined. We have taken notice of its Muſcles in Chap. VII. where we have alſo ſhewn how to ſeparate the *Cutis* and *Membrana Carnoſa*, with the *Præputium*. By making a tranſverſe Section in the *Penis*, you will ſee its bodies made up of a ſpungy blackiſh Subſtance, and their nervous Coat, without diſſecting it; in the Middle they are connected by a ſtrong Ligament *, therefore not eaſily ſeparated. The *Urethra* is almoſt of the ſame ſpungy Subſtance with thoſe that compoſe it; but it is eaſily ſeparated from them by making a longitudinal Section; however, its Separation is of no great Moment. Its interior Surface is very ſmooth, to obſerve which you need only open it with the diſſecting Knife.

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* *Spigelius* makes it to be tranſparent, which is more than ever I could obſerve.

CHAP. XII.

Of the Parts of GENERATION *in* WOMEN.

YOU may obſerve the Parts in the *Pudendum*, without uſing a Knife, *viz.* the *Mons Veneris*, with the Hair growing on it, the *Labia* ſituate on both Sides of the *Rima Magna*, which, if drawn a little aſide, you will ſee the *Carunculæ Myrtiformes*, above the Extremity of the *Clitoris*, the Orifice of the *Urethra*, and the *Hymen*, if not rent. But if you have a Mind to go further, you muſt make uſe of the Knife thus: Having laid open the Legs, and put a wooden Block under the Buttocks, make a longitudinal Inciſion in the Skin on each Side near the *Foſſa Magna*, to meet behind the *Foramen Ani*, which afterward ſeparate, according to the above Directions. Before you ſeparate the Fat, trace round the Ligaments of the Womb, and ſee whether they are, according to *Riolan*, extended to the Leg, or whether, as is generally obſerved, they end in the *Os Pubis*. Having made an Inciſion in the *Peritonæum*, return from the internal to the external Parts: Theſe being removed, cut off the thick Lump of Fat in the *Mons Veneris* to the Bone, and ſeparate it about the *Pudendum* from the *Os Coxæ*; if the *Clitoris* be very large and conſpicuous, you may take a View of its Bodies, which are joined near the Contexture to the *Oſſa Pubis*, and at the Sides you may obſerve ſome carnous Fibres, which are reckoned the Muſcles of the *Clitoris*. But the abovementioned Parts are ſcarce viſible in a Child or new born Infant. However, ſeparate them all from the *Oſſa Coxæ*, to make a ſmall Apperture to the Inſide; then ſeparate the *Oſſa Pubis* with a Knife as you did in the Male Subject, likewiſe cut off the Fat round the *Vulva* and *Podex*.

Having taken a full View of the natural Situation of the Womb, you are next to enter upon the Adminiſtration of the internal Parts; firſt free the *Ovaria Vaſa Præparantia*, both Artery and Vein, likewiſe the Ureters; then make Ligatures on the Trunk of the Artery and Vein, cut them aſunder above the Emulgents, and ſeparate them from the Spine. If you intend to ſearch for the Thoraic Duct, take particular care not to hurt it now, for it lies very near, as has been already mentioned concerning the Kidneys. Having removed the Kidneys and *Capſulæ Atrabilariæ* out of their Place, take them aſide along with the other Veſſels; but when you come to the *Pelvis*, take care not to cut any other Veſſel, except that which enters the *Foramina* of the *Os Latum*, or goes to the *Femur*; for you may happen to cut the Uterine Veins and Arteries. Having taken out, through the Fiſſure made in the *Oſſa Pubis*, the Veſſels, and what adheres to them, you may ſeparate the remaining Parts in the *Pelvis* by way of Excoriation, and exterminate them with the Fat. Separate next the *Inteſtinum Rectum* from the Neck of the Womb to which it cloſely adheres, therefore take care not to wound it with the Knife; then remove the remaining Fat round the Orifice of the Womb, but do not touch the *Clitoris.* What is next to be done, and how the Uterine Veſſels are to be ſeparated, I cannot direct you by Words, nor will I take upon me to lay down Rules for you to go by; but I would earneſtly recommend you to the Practice thereof, which will be your beſt Guide. However, I will give you a few ſhort Directions. Firſt, every Part muſt be removed that does not come under the Denomination of the Veſſels of the *Uterus* and Bladder. Next, after removing the Membranes, begin from the greater, and proceed to the leſſer Branches of the Veſſels. Laſtly, remove the Fat lying between the Veſſels, to ſee their innumerable Divarications. This is all that can be ſaid in general concerning the Diſſection of the *Uterus*, and Words will not allow to be more particular; therefore put your Hand to the Work, and Practice will beſt direct you how to proceed. Some Parts yet remain, which, before the Womb is thrown away, and you proceed further, muſt be taken notice of. To come at a full View of the interior wrinkled Surface of that Part of the Womb, its Neck, which adheres to the *Inteſtinum Rectum*, muſt be laid open, therefore, open in the Middle the whole poſterior Part of the *Vagina*, as far as the inner Mouth of the Womb, which is a more ſolid Subſtance than the *Vagina*, and apt to give way to the Preſſure of your Hand. Having opened the *Vagina*, you will ſee the Orifice of the *Matrix*, reſembling a Fiſh's Mouth, when open. The Bottom of the Womb muſt next be diſſected, to come at the Sight of its Inner Cavity. Some cut it open tranſverſely, others longitudinally like the *Vagina*, but the laſt ſeems to me the moſt proper, *viz.* Beginning your inciſion in the ſuperior Part of the Womb, ſo as to make a ſtreight Line with the *Cornua Uteri*, and thus continuing your Section to its Orifice, that the Womb may be cut aſunder in two equal Parts, or near it. Beſides the pinguous Subſtance of the Womb, you will here ſee an infinite Number of ſmall *Foramina*, being the Extremities of the diſſected Veins of the *Uterus*, which, if inflated with a Blow-pipe, you will obſerve reach the Veſſels adjoining the *Ovaria*. In the Middle of the Cavity of the *Uterus*,

Uterus, you will ſee a Line owing its Riſe to the *Vulva*.

You are, after the Adminiſtration of the *Uterus*, to cut open its CORNUA lengthways, where you will meet with a ſmall Nerve, near the Bottom, very much cried up by *Riolan*. It is about three Fingers long, and terminates in that great Veſſel called the FALLOPIAN TUBE, divided into ſeveral Cells, being the Receptacles of a viſcous Humour, almoſt of the ſame Nature with that contained in the *Ovaria*, which are next to be cut open, to ſee whether their contained Fluid deſerves the Name of *Semen*.

BOOK II.

Of the THORAX or CHEST.

CHAP. I.

Of the COMMON INTEGUMENTS and BREASTS.

THE common Integuments of the middle Cavity claim the chief Place; the firſt of which is the Skin, whoſe Inciſion is to reach as far as the Throat; the Skin is afterward to be divided by another Section, *viz.* By beginning from the End of the former Inciſion, and proceeding in a ſtreight Line above the *Acromium*, through the anterior Part of the Arm to half the *Humerus*, and this to be done on both Sides; then ſeparate the Skin from the Fat in the ſame Manner as has been directed in Book I. Chap. I.

You here meet with the BREASTS, which, lying under the Skin, introduce ſome Alteration in this Separation. In Males, ſcarce any Subſtance is to be found beſides the Nipples; but in Females, a great many Parts are to be obſerved, eſpecially in pregnant Women, or wet Nurſes; therefore, while ſeparating the Skin from the Breaſts, you are to take Care of the Glands interſperſed among the Fat. Having come to the Nipple, you find a large Gland which is compoſed of many leſſer ones, to which there is a Concourſe of ſeveral lacteal Tubes. To preſerve theſe in raiſing the Skin, make an Inciſion round the Nipple, and leave the Skin on the Breaſt; as for the reſt, you may not only ſeparate the Skin on the Breaſt, but alſo in that Part of the Shoulder next it, to come at the Inſertion of the pectoral Muſcle. Having raiſed the Skin, proceed to the Diſſection of the Fat in ſuch a Manner as you did the Skin, and clear it from the Fleſh. Under the Arm-pits, the Separation of the Fat is ſomewhat difficult, becauſe it is there intermixed with muſculous Parts; therefore it muſt be carefully ſeparated, for fear of cutting the Veins which from thence deſcend into the Arms.

This is the Method of diſſecting the Body of a Virgin; but if it be a Woman that has Milk in her Breaſts, you are to change your Operation. You are to pull up the Fat with a ſmall Hook, which is deeply intermixed among the Glands, and cut off the ſtrong Fibres with the Point of a Knife; you may thus remove the Fat without hurting the Glands, for it lies moſt upon them. But theſe Glands are immediately joined to the pectoral Muſcles by a peculiar Membrane, which is pretty thick in wet Nurſes, and hard to be ſeparated from the Glands, but very eaſy from the pectoral Muſcle through which the Veins take their Courſe to the Breaſts. If there is ſtill remaining any Quantity of Milk in the Breaſts, you will obſerve the lactiferous Veins, or lacteal Tubes, every where diſperſed among the Glands, and uniting at the Nipple, where they terminate in thicker Branches. To diſcover the Divarications of theſe Branches near thoſe Places where the Tubes are moſt apparent, divide the Skin lengthways carefully with the Knife, and you will ſee ſeveral ſmall Branches proceeding from a large Trunk, but you muſt take Care not to wound them ; becauſe, when deprived of their milky Juice, they immediately diſappear.

CHAP. II.

Of the MUSCLES *upon the* BREAST.

UNDER the Breaſts lies the MUSCULUS PECTORALIS, which ariſes from the *Clavicula*, *Sternum*, and true Ribs, and is inſerted a little below the Head of the *Humerus*. To ſeparate this Muſcle, you are neither to begin at its Origine nor Inſertion, but from the inferior Part under the *Axilla*. Having pulled the Arm a ſmall Diſtance from the Body, make a ſlight Inciſion in the Membrane which joins the Muſcle to the Intercoſtals, and putting your Finger under, ſeparate it by way of

Excoriation; but cut off its Origine with the Knife, proceeding from the inferior to the ſuperior Part; then ſeparate it from the *Clavicula* and *Deltoides*, with which it is joined in its Progreſs. When ſeparated, lay it aſide over the Arm*. Betwixt this and the *Deltoides*, near the Extremity, iſſues out the Cephalic Vein, which take Care of not to wound. The ſecond is the SUBCLAVIUS, ſituate under the *Clavicula*, as its Name ſhews. It proceeds obliquely from the *Clavicula* to the firſt Rib; therefore, in diſſecting this Muſcle, you are to ſeparate its Sides by an oblique Inciſion, and then cut it off from the *Clavicula* and firſt Rib. But take Care not to hurt the ſubjacent Blood Veſſels.

Thirdly, the INTERCOSTALES are Forty four in Number, and from the Direction of their Fibres, are divided into external and internal. In the Adminiſtration of theſe Muſcles, you are to make a ſlight Inciſion, following the Tract of the Bone, ſo as that the Knife may not reach beyond one Half of the fleſhy Part, (for this is the only Way to determine the Thickneſs of this Muſcle) ſeparate the Fleſh as far as diſſected, that the intercoſtal Space may be denudated, and the contrary Direction of the Fibres of the internal intercoſtal Muſcle ſhewn; for that which you firſt diſſected, was the external intercoſtal Muſcle. The internal intercoſtal Muſcle adheres to the *Pleura*, which may be ſeparated after the ſame Manner, providing you do not hurt the *Pleura*. The Inteſtines between the Cartilages, ſeem to have no Relation with the external intercoſtal Muſcle, becauſe they have different Fibres,

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* *Galen* makes this a double Muſcle, which is only a ſingle one, though there is a great Variety to be obſerved in its Fleſh, which, Plate-like, is laid upon one another.

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CHAP. III.

Of the Method of opening the THORAX.

IN opening the *Thorax*, *Galen* uſed a quite different Method to what is now practiſed. He divided the *Os Pectoris* with a ſharp Knife into two; an Operation, which is ſcarce capable of being performed in an adult Subject, and attended with Uncertainty and Trouble; According to *Fernelius*; therefore, We now open the *Thorax*, by ſeparating the Cartilages of the *Sternum* from the Ribs, which *Galen* knew very well how to do, though he divided the *Os Pectoris* in the Middle. This Operation of ſeparating the Cartilages from the Ribs, may be performed two different Ways, *viz.* either by ſeparating the *Sternum* from the Diaphragm, and leaving it adhering to the Clavicles, or by cutting it off at the ſuperior Part, and leaving it fixed to the *Septum Tranſverſum*.

The Operation ſucceeds both Ways; in the firſt, the Cartilages and Ribs are to be ſeparated after the following Manner. Having removed the Membranes, Muſcles and Fat, find out the Union of the Cartilages and Ribs, which is eaſily done by the Difference of their Colour; for the Cartilages are of a whitiſh, and the Bones of a livid or cineritious Colour; then fix a ſharp broad pointed Knife between your Fore-finger and Thumb, ſo as that the Point may not exceed an Inch beyond them; afterward thruſt the Knife next the Rib into the Cartilage, and cut it aſunder. The ſame Operation takes Place in all the Ribs except the firſt; For the Clavicle muſt be removed, before you can cut the firſt Rib; therefore, cut off all the Muſcles which have their Origine above the Clavicle, then ſeparate it with a Knife from the *Sternum*, by making a ſinous Section according to its Union, and turn it up to the Head, which will bring you to the firſt Rib; but take Care, while ſeparating the Clavicles, you do not wound the Subclavian Branches, leſt you ſhould be forced to ſpend Time in making Ligatures. The Clavicle being laid aſide, find the Union of the firſt Rib with the Cartilage * by its Motion; then ſlide your Knife gently along under the Rib, turning its Edge outward, to prevent wounding the Subclavian Veſſels. Having ſeparated the Cartilages, make an Inciſion in the intercoſtal Muſcles and *Pleura*; but if you incline the *Sternum* ſhould remain contiguous to the upper Part, ſeparate it from the Diaphragm, *viz.* By lifting up the *Sternum* on either Side, and putting a Knife into the Cavity of the *Thorax*, divide the *Septum* from the Cartilages of the ſuperior Ribs; which Section repeat on the other Side, and lay it over the Face, after ſeparating the Membranes of the *Mediaſtinum* from the *Cartilago Xiphoides.*

If you intend to begin at the Throat, and leave the *Sternum* adhering to the Diaphragm, cut off the Muſcles from the ſuperior Part of that Bone, but take Care not to hurt the Veſſels aſcending to the Head, free the Membranes, raiſe the *Sternum*, ſeparate the *Mediaſtinum* as before, and turn down the *Sternum* upon the *Abdomen.* If you incline to take the *Sternum* quite away, begin where you pleaſe, and proceed with both the abovementioned Operations. In the mean Time, you may take a View of the Situation and Connection of the *Mediaſtinum*, before the Separation of the *Sternum*, which afterwards becomes flaccid, therefore not ſo viſible. On the Inſide of the *Sternum*, after removed, you may obſerve the *Muſculus Triangularis*.

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* It is here to be obſerved, that the firſt is longer than the ſecond Cartilage, contrary to what is apparent in the reſt, where the ſuperior is always the ſhorteſt.

To take a full View of the Contents of the *Thorax*, *Galen* required a larger Apperture, therefore bended backward the adjoining Parts of the Ribs to the *Vertebræ*, with ſuch a Force as to break ſome of the Bones; but there is no Need of this, ſince the opening made by the Separation of the *Sternum* from the Ribs, is ſufficient for that Intention.

CHAP. IV.

Of the DIAPHRAGM.

IF you intend to take a View of the natural Situation of the Diaphragm, it muſt be done before the *Thorax* is opened, and after the *Abdomen* is cleared of its Contents, in which you will ſee two *Foramina*, and the Veſſels diſperſed through its nervous Part. But when you deſign to ſeparate it, begin its Adminiſtration in the Cavity of the *Thorax* thus: On the Right-ſide, at a ſmall Diſtance from the Ribs, depreſs the Diaphragm with the Palm of your Hand, that the connecting Fibres may be extended, and more eaſily cut off with the Point of the Knife. Repeat the ſame Operation on the Left-ſide, and when you cannot depreſs the Diaphragm longer with the Hand, take hold of it, and pull it down with ſuch a Force as to break the extended Fibres; but carefully ſeparate its two tendinous Proceſſes, firmly adhering to the Spine, on account of the ſubjacent Thoraic Duct, which muſt be carefully obſerved; therefore, the moſt convenient Method will be, to lay the Diaphragm upon the Breaſt, and begin the Diſſection of its Proceſſes at the prominent Bodies of the *Vertebræ*, taking Care not to ſeparate any Part of the Fat, under which the Thoraic Duct lies concealed. Spread the Diaphragm, after taken out, on a Table for a Demonſtration.

CHAP. V.

Of the Method of extracting the Contents of the THORAX.

ANATOMISTS generally expoſe to View the Water contained in the *Pericardium*, before they extract the *Viſcera* out of the *Thorax*; therefore take hold of the *Pericardium* with your Hand, and make an Inciſion large enough to ſee the Water, which you may either take out with a Spoon, or ſhew it in the *Peri-*

Pericardium, by removing the *Apex* of the Heart a little aſide. You may from thence proceed to the Adminiſtration of the *Viſcera*, becauſe the *Trachea Arteria*, and Tongue, are taken out along with the Contents of the *Thorax*. The Skin of the Neck muſt be a little further ſeparated; therefore make an Inciſion under the lower Jaw, reaching to the Chin, and then ſeparate the Skin after the uſual Method up to the Ears. In the ſame Manner remove the Fat, but take Care not to hurt the *Latiſſimus Colli*, which is a thin membranous Muſcle lying immediately under the Fat; ſeparate the *Muſculi Maſtoidei* near their Origine, they being already ſuppoſed to be cut off from the *Sternum*, and lay them on both Sides; then remove the *Muſculi Sternothyriodei* a little out of the Way, to give Room for coming at the ſubjacent Parts; afterwards ſeparate carefully the *Muſculi Coracoligoidei*, which obliquely extend to the *Proceſſus Coracoides*, and lay them over the Larynx.

Having finiſhed theſe preliminary Operations, and removed the Clavicle out of its Place, ſeparate the *Thymus* from the Sides, where it lies very deep, and adheres cloſe to the Veſſels, but take Care not to hurt the *Cava*, which would cauſe an Effuſion of Blood; then clear the Axillary Veſſels of their Fleſh and Membranes, and make two Ligatures on each Veſſel, at ſame Diſtance from the Trunk. In the ſame Manner proceed with the external and internal Jugulars and *Carotides*, when ſeparated, (the farther from the Trunk, and nearer to the *Cranium*, the better) and then cut them all aſunder. This is the common Way of proceeding; but if you want to ſee the Entrance of the Thoraic Duct, make two Ligatures on the Veins of the Left-ſide, where the aſcending Trunk begins to divide itſelf into Branches; for this Veſſel terminates in the left ſubclavian Vein, as has been already mentioned.

In order to take out the *Trachea Arteria* intire, which aſcends to the Throat, come to the lower Jaw, and firſt ſeparate the *Muſculus Digaſtricus*, creeping along the inferior Part of it, from the Fleſh with the Back of the Knife, but not from the Bone; then ſeparate the Muſcles of the Tongue and *Os Hygoides* clean from the interior Side of the *Maxilla* inferior. When you come to the Tunich of the Mouth, make an Inciſion therein near the Teeth of the lower Jaw, to put your Fingers into the Throat, and pull up the Tongue, in order to ſeparate its Muſcles ariſing from the *Os Styloides*. To perform this Operation with greater Eaſe, deſire your Aſſiſtant to pull back the lower Jaw with the Head as much as he can, and keep them ſteady while you are cutting out the *Uvula* and *Gula*. At the ſame Time, take out the Tonſils or Almonds, ſituate at the Sides of the Tongue, with the ſixth Pair of Nerves, which deſcends into the *Thorax*.

This being done, pull out the Tongue, by depreſſing it with your Left-hand, and, with a large Knife, fixed in a good Handle, cut through the *Membrana Palati* tranſverſely above the *Uvula*; then, fixing a ſmall Hook into the Extremity of the Skin where the Inciſion was made, and pulling back that Membrane, ſeparate it from the adjacent Parts, by which if you pull the *Gula*, with its adjoining Parts, they will eaſily follow, after the Fibres are cut with the Point of the Knife which unite the *Oeſophagus* to the *Vertebræ*. Continue this Operation till you come to the third *Vertebra* of the Back, where the *Vena Azygos*, or *Sine Pari* riſes out of the *Cava*. On this Branch make two Ligatures, and cut it aſunder between them; then turn toward the *Abdomen*, and, becauſe the intercoſtal Arteries lie in your Way, you may either make Ligatures on, or directly cut them off, till the Trunk of the *Aorta* is quite clear. While you are ſeparating the *Oeſophagus* or *Aorta* from the Spine, I would adviſe you not to be too nice in removing the Fat, leſt the Thoraic Duct ſhould be wounded.

After the Extraction of the *Viſcera*, the *Pleura* is next to be ſeparated; in order to which, firſt raiſe it from the *Vertebræ* with the Knife, then pull it from the Ribs with your Hands.

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CHAP. VI.

Of the Method of preparing the VISCERA *of the* THORAX.

IN what Manner the *Viſcera*, contained in the *Thorax*, after taken out, may be cleared of their ſuperfluous Parts, can rather be hinted at than deſcribed by any general Rules; however, I will endeavour to lay down the Order by which you are to proceed in theſe Operations. Firſt, cut off the *Oeſophagus*, becauſe there is no farther Uſe for it here; then ſeparate the *Thymus* in the Fore-part, if not already done, from the Veſſels; afterward remove the Fat with the uſeleſs Membranes, and the *Pericardium* likewiſe, that the *Trachea Arteria* may be cleared of every Thing except its Muſcles, and the Veſſels of the Heart appear more viſible when freed of their foreign Parts. But obſerve not to cut aſunder the *Ductus Arterioſus*, which is only pervious in the *Fœtus*, and makes a Communication between the

Trunk of the *Aorta* and Pulmonary Artery, nor the Nerve of the ſixth Pair, deſcending along with the *Trachea*.

The ANATOMY of the Heart comes next This you are to take in your Hand, and hold it with the *Apex* uppermoſt, which muſt be cut off about the Breadth of an Inch, to ſhew the Diverſity of the Ventricles. Then, having cut open the right Ventricle and Auricle longitudinally, obſerve the *three Valves* called *Tricuſpides*, ſituate between the Auricle and Ventricle, likewiſe the tendinous Ropes, which faſten them to the fleſhy Pillars of the Heart, and ſerve, when the Point recedes from its Baſe, to ſhut the Valves upon the Entrance of the Blood; you are to take a View of the different Surfaces of the Auricle and Ventricle; alſo trace with a Probe the Pulmonary Artery, and its Entrance into the Lungs, and afterwards cut it open, to ſee the *three ſemilunar Valves*, placed near its Union with the Ventricle.

The Adminiſtration of the left Ventricle is the ſame with that of the right, except at the Entrance of the Ventricle, near the Pulmonary Vein; it has only *two Valves*, called

Mitrales, and near the *Aorta three ſemilunar Valves.* In a *Fœtus*, you are alſo to obſerve the *Anaſtomoſis* of the *Cava* and Pulmonary Vein, by Means of the *Foramen Ovale*, near the Entrance of the *Cava* into the Heart, with a Valve annexed to it for hindering the Return of the Blood; likewiſe the *Ductus Arterioſus*, or a communicating Canal between the Pulmonary Artery and the *Aorta*, whoſe Diameter will only admit of a ſmall Probe; but this Canal, with the *Foramen Ovale*, are afterwards ſhut up.

After the Heart you are to enter upon the LUNGS, and the firſt Thing to be taken in hand is the Diſſection of the *Parenchyma*; in which make an Inciſion at the Entrance of the *Trachea*, with its Ramifications, into the Lungs, and, following the Tract of the *Trachea*, ſeparate it where the Blood Veſſels keep cloſe to the Rings; * likewiſe take notice of the *Annuli* and *Larynx*, which you will ſcarce get a Sight of before they are cleared of their Muſcles.

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* *Highmore* has given us a very exact Delineation of it; but whether he made uſe of the ſame Method of Separation, is to be doubted.

CHAP. VII.

Of the MUSCLES *of the* LARYNX, OS HYOIDES, and TONGUE.

BECAUSE the *Larynx*, *Os Hyoides*, and *Tongue*, are connected with the *Aſpera Arteria*, the *Method* of diſſecting their Muſcles are to be deſcribed in this Chapter. Theſe Muſcles are very numerous and minute, therefore it is eaſier to ſhew their Anatomy, than to explain it by Words. If you intend to enter upon their Adminiſtration, you muſt firſt get acquainted with their Number, Names, and Figure, from ſome exact Anatomical Author, ſuch as *Euſtachius*, &c. and then attempt their Separation in the following Order. Firſt, remove the Glands ſituate at the Root of the Tongue, and reſerve them for Demonſtration, if intended; then do the ſame with the other Glands adhering to the *Trachea*, near the Annular Cartilage, alſo the uſeleſs Membranes; afterward raiſe in the anterior

Part, according to the following Order, the *Muſculi Caracohyoidei*, *Sternohyoidei*, *Sternothyroidei*, *Hyothyroidei*, *Cricothyroidei*, *Thyroarythænoidei*, and *Cricoarytænoidei laterales*, which two laſt you may ſee in their natural Situation.

Theſe Muſcles lie all under the *Os Hyoides*; above which, firſt ſeparate the *Geniohyoidæi Externi*, with the *Geniohyoidæi Interni*, or *Genioglossi*; then the *Ceratoglossi*, from the *Cornua* of the *Os Hyoides*, and the *Baſioglossi* from its Baſis, having likewiſe ſeparated the *Styloceratohyoidæi* from the *Styloglossi*, which are inſerted into the Sides, you may take out the Tongue. Having inverted and cleaned the *Trachea*, you will obſerve the *Arytænoidæi*, and the *Cricoarytænoidæi poſtici*, which you may either raiſe, or let alone.

You now come to the Preparation of the TONGUE, for obſerving its *Nerves*, *Blood Veſſels*, and *four Pair of Muſcles*. Firſt, ſeparate the *Styloglossi*, ſituate on both Sides of the Tongue; next to theſe, the *Myloglossi*, diſtinguiſhed from the former only by the Direction of their Fibres; then the *Ceratoglossi*, and laſtly, the *Baſioglossi*, in the Middle of the Tongue. You may diſſect the Nerves and Blood Veſſels, to ſee beautiful Ramifications; afterward make an Inciſion croſs the Tongue, in order to examine its Subſtance, which is very ſoft.

BOOK III.

Of the HEAD.

CHAP. I.

Of the INTEGUMENTS *of the* HEAD.

THE Integuments of the Head are the Hair, Skin, *Pericranium*, *Perioſteum*, and the Skull. I have already deſired the Body to be ſhaved all over, and the ſame muſt be done with reſpect to the Head.

Make a crucial Inciſion in the Skin in form of a St. *Andrew*'s Croſs; begin your firſt Inciſion at the Root of the Noſe, croſs the *Vertex*, and terminate in the Neck; afterwards begin your ſecond in the Maſtoide Proceſs behind the Ears, and end it in the ſame Place, on the oppoſite Side. Take Care your Knife do not go deeper than the Skin, and cut the *Pericranium*. After the Inciſions are made, you can here more eaſily ſeparate the Skin than in any other Part of the Body, becauſe there is very little or no ſubjacent Fat; if there is, it muſt be raiſed with the Skin, becauſe the Hairs are rooted in it. In ſome Places, ſeveral Muſcles lie immediately under the Skin; as thoſe on the Forehead, behind the Ears, on the Noſe, Mouth, and Eyes; to which a particular Care muſt be had in raiſing the Skin.

The Skin being taken off, and laid aſide, make a crucial Inciſion in the PERICRANIUM, which muſt be done with a light Hand, for fear of wounding the *Perioſteum*; then raiſe the *Pericranium* gently, and ſeparate its Fibres from the *Perioſteum* as far as you think proper.

In the ſame Manner make an Inciſion in the PERIOSTEUM as you did in the *Pericranium*, and gently raiſe it from the Skull with the Back of your Knife, to keep it intire. The Diſſection of the Skull will be ſhewn hereafter.

CHAP.

CHAP. II.

Of the MUSCLES *of the* FACE.

THE frontal Muſcles are the firſt to be ſeen after the Skin is raiſed, and the Method of diſtinguiſhing them is by beginning above, and ſeparating them from the Skull, till you come to the Orbit of the Eye. The other Muſcles of the Face muſt alſo be laid bare before you can diſcover their Situation: Make therefore an Inciſion in the Skin along the Ridge of the Noſe and Middle of the Lips, then carefully ſeparate it on account of the ſubjacent Muſcles. When you raiſe the Skin from the Eye-lids, do not touch the Hair, that you may afterward ſee the *Tunica Adnata* to greater Advantage. Having removed the Skin, the *Orbicularis* of the Eye-lid requires no farther Diſſection, unleſs it be to ſeparate it in the inferior Part, where it adheres to the above, than the *Triangularis* ſituate on each Side of the Noſe. The other Muſcles belonging to the Noſe are ſo very ſmall as not to be diſcernible, except it be in thoſe who are furniſhed with large Noſes.

Before you enter on the Diſſection of the Labial Muſcles, the Fat muſt be carefully removed, to avoid hurting theſe ſmall Muſcles. There are two Muſcles which pull up the Lip, one ariſing from the *Mala*, the other from the *Os Jugale*, called by *Riolan*, *Zygomaticus*. Under theſe lies a pretty broad Muſcle forming the Cheek, hence denominated *Buccinator*. There is a Muſcle which ſurrounds the Mouth like a Ring, and from its Uſe, which is to conſtringe, or draw both Lips together, is termed *Sphincter Labiorum*. This Muſcle is eaſily known from its circular Fibres. It is not neceſſary to inſiſt upon ſhewing the Method of diſſecting theſe Muſcles, becauſe, if you follow the Courſe of their Fibres, they will direct, and prevent you from committing any Miſtake.

CHAP. III.

Of the MUSCLES *of the* LOWER JAW.

THE Lower Jaw, on account of Maſtication, is furniſhed with ſeveral moveable Muſcles, which I intend to mention here, becauſe the *Crotaphite* Muſcle muſt leave its Situation before the Skull can be opened; you are therefore firſt to raiſe from the Neck the *Plotyſma Myodes*, ſo called by *Galen*, and by *Riolan*, the *Latiſſimus Colli*, and leave it adhering to the Edge of the lower Jaw, near the Angle of the Mouth, where it is inſerted. You are next, after removing the Parotide Gland out of the Way, to raiſe the *Maſſeter* Muſcle, lying upon the poſterior Part of the *Maxilla*, which is done by ſeparating its anterior Part from the Bone, and then leaving it adhering to the lower Jaw.

This done, you now come to the *Temporal* Muſcle, Part of which lies under the *Maſſeter*,

Maſſeter, but the *Os Jugale* muſt firſt be removed, before you can enter upon the Adminiſtration of this Muſcle; therefore the *Os Zygomaticum* muſt be twice ſawed through acroſs; once near the Eye, and then again at the Maſtoide Proceſs. The Part cut off by theſe Sections, muſt firſt be ſeparated from the Muſcle, and then removed; afterward raiſe the *Temporal* Muſcle from the Skull; but take Care, while you are about this Operation, not to hurt the Temple Bone, (which is only a thin Scale laid over Part of the *Os Sincipitis.*) When the Muſcle is thus ſeparated, it will adhere to the Coronoide Proceſs of the lower Jaw, that being the Place of its Inſertion.

The lower Jaw muſt next be ſawed longitudinally through the Middle, which Section muſt fall between the *Dentes Inciſores*, exactly performed. When both Parts of the Jawbone, thus ſeparated, are drawn aſide, you will ſee in the interior and inferior Part of this Bone the *Digaſtric* Muſcle, whoſe middle Tendon generally perforates the *Styloceratohyoideus*, of which already in Chap. VII. Book II. Raiſe the *Digaſtricus*

cus * at its Inſertion into the Edge of the lower Jaw, near its Commiſſure above the *Mylohyoidæus*, and cut it off at its Origine, from the Sides of a remarkable *Sulcus* excavated internally, near the Root of the Maſtoide Proceſs.

If the Head be ſeparated from the Trunk, you need not diſſect the Jaw; becauſe, by turning the Head upſide down, you may eaſily perform this Operation, providing you take Care before hand not to remove the Muſcles of the Head and Neck.

There remains the two *Pterygoidei Interni* and *Externi*, which agree in their Progreſs and Inſertion, but differ in their Origine; the former ariſe from the external, and the latter from the internal Part of the Pterygoide Proceſs: Therefore, in ſeparating them, you need only take Care to diſtinguiſh them from each other; and, in order to this, after having removed the *Crotaphite* Muſcles, depreſs the Jaw-bone a little, and cut it out, then cut off from the Bone the external Pterygoide Muſcle, which is much leſſer than the in-

* *Bartholine* calls this Muſcle *Graphoides*.

ternal one, and ſeparate it from its Fellow. You will now ſee the internal Pterygoide Muſcle adhering to the Inſide of the lower Jaw, and you may ſeparate it in the ſame Manner as the *Maſſeter* was done.

CHAP. IV.

Of the DISSECTION *of the* SKULL.

THE Diſſection of the Skull is not always performed after the ſame Manner. The Ancients uſed one Method, uſually called the *Common Method*, or *Sectio Vulgaris*; and *Conſtantius Variolus* contrived another, which is denominated, from its Inventor, *Sectio Variolana*. I will begin with a ſhort Explication of the firſt, and then ſay ſomething concerning the laſt.

The Common Method.

In order to make an equal and ſtreight Section, tie a double Thread round the Skull in a ſtreight Direction, without bending either upward or downward; let it reſt upon the Frontal Bone, a little above the Orbit of the Eye, bring it round the Temple Bone to the *Occiput*, and there paſs it over the lamboidal Suture, about two Inches Diſtance from the End of the ſagittal Suture; from thence bring it over the Temple Bone on the oppoſite Side, and to the ſame Place of the Frontal Bone, above the Orbit of the other Eye, and then faſten it.

When the double Thread is thus tied round the Head, make, with a ſharp-pointed Knife ſuch an Inciſion in the Skull, between the two Threads, as may ſerve for a Mark or Line to direct the Saw in cutting through the Skull. But the Head being of a ſpheroidal Figure, you muſt have an Aſſiſtant to hold it ſteady during the Operation. Even thoſe who draw the Saw with one Hand, ought to put the other againſt the Head. But to make the Operation eaſier, I have

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have contrived an Inſtrument that holds it ſo very tight, that it can move to neither Side. See its Structure in the following Plate.

Unite the Threads now, and cut the Skull round with ſuch a Saw as is commonly made uſe of in Amputations. Perhaps it may be expected I ſhould here lay down Rules how deep the Saw muſt enter; but as the Skull is not of the ſame Thickneſs in all Bodies, nor in every Part of it, it is therefore very difficult to confine you to certain Rules: However, I would adviſe you not to uſe your Saw with too much Violence, but to pull it gently backward and forward, and now and then to take it out, to try with the Knife whether the Bone is cut through; if it is not, you are to go on with your Operation till it is, which you may diſcover by the crackling Noiſe. Continue your Diſſection round the Skull, ſtill keeping in your Mark or Line, till you come to the Place where you firſt entred the Saw. Some Parts of the Skull can ſcarce be cut through with a ſtreight Saw without hurting the Meninges of the Brain; therefore I think it more convenient, on this Account, to uſe a Saw whoſe Blade is crooked, in Form of a Creſcent; but I leave it to every one's Pleaſure, whether he will chooſe this Method, or rather uſe the Knife, where the Saw cannot ſafely reach. Two Perſons ſhould be employed in performing this Operation with the Saw, one to puſh it forward, and another to pull it backward, that it may not ſhift its Place, eſpecially if it happen to be of a pretty large Size, which then cannot be managed with that Exactneſs it ought to be by one Perſon.

When the Skull is ſawed round, it muſt be thus ſeparated; introduce an Iron Spatula, or ſuch like Inſtrument, into the Fiſſure made by the Saw, to break the ſmall Splinters of the Bone where the Saw has not gone through, and the ſtrong Fibres wherewith the *Dura Mater* is faſtened to the Skull; for though the Skull be quite through, yet it requires a conſiderable Force to pull off its ſuperior Part, becauſe it is firmly connected to the *Dura Mater*, by Means of Membranes and Blood Veſſels.

If you intend the Head for a publick Demonſtration, the neateſt Way to perform the Operation, is by leaving it on the Trunk, and ſawing round the Skull as above directed. That the *Vertex* may not incline from Side to Side while you are employed in the Operation, it muſt therefore be held ſteady by an Aſſiſtant; which being too laborious, I have contrived a Machine, which being put under the Head, holds it ſo high as to make the Diſſection of the Brain eaſy to the Anatomiſt. See the following Plate.

The VAROLIAN *Method.*

This is managed after a quite different Method to the former; for he ſo takes off the ſuperior Part of the Skull, that the inferior, where the Nerves lie, may firſt preſent itſelf to View, which is thus done. Take off the frontal Muſcles, with thoſe of the Head and Neck, ſo clean as not to leave a carnous Fibre behind them, ſeparate next the Head from the *Vertebræ*, when this is likewiſe cleared of its Fleſh, after the following Manner; bend the Head forward, cut through the ſpinal Marrow, disjoint the Bones, and cut through the Membranes and Ligaments that unite them, then take out the Eyes, of which more in Chap. VIII. You will now want a Saw, which muſt be uſed after the ſame Manner as above directed, but fixed in another Place, which is the only Difference betwixt this and the preceding Diſſection of the Skull. Fix therefore the Saw ſo at the Root of the Noſe, that the Section may be made above the Orbits of the Eyes, and over the mamillary Proceſſes to the *Occiput*. If you can hit the ſuperior *Lamina* of the Orbit, the Operation is exactly done, but if you cannot make an Inciſion in the *Lamina*, then, juſt behind the above mentioned Proceſſes, make another, and continue it on both Sides to the great *Foramen* of the Occipital Bone. The Skull being thus divided, put your Finger, or a ſmall Hook, into the anterior and inferior Part of it, then, raiſing it up, ſeparate the *Dura Mater* with the Knife from the Bone; but if you find any Difficulty, make an Inciſion in the ſaid Membrane along with the Bone, and cut off the Nerves and Blood Veſſels cloſe to the Bone, the inferior Part of the Skull will afterward eaſily come away. But if you want a fuller Account of the Method of performing this Operation, ſee *Spigel. Corp. Human.*

The Skull being, by this laſt Method, rendered unfit for the oſteological Demonſtrations, makes me therefore chooſe the firſt;

which, with a ſmall Variation, ſo removes the Bones of the *Vertex*, that the Brain can be taken out and demonſtrated on the oppoſite Side. The only Difference conſiſts in this, that the circular Section ſhould be immediately begun above the Orbits, and from thence continued towards the great *Foramen* of the occipital Bone. The ſuperior Part of the Skull being taken off, ſeparate the *Dura Mater* according to the Directions given in the next Chapter. Lift up the prominent or anterior Part of the *Cerebrum*, cut off the Point of the *Falx*, with the firſt, ſecond, and third Pair of Nerves, cloſe to the Bone, and ſo with the reſt in their Courſe. You ſometimes lift up the *Cerebrum* on one, and ſometimes on both Sides, and cut off the Nerves paſſing through the lateral *Foramina* of the Skull. Raiſe up the poſterior Part of the *Cerebrum*, lay the *Falx* a little aſide, and cut off that Part of the *Dura Mater* which divides the *Cerebrum* from the *Cerebellum*, by beginning your Section at the *Falx*, and carrying it on to the *Occiput*; but if not large enough, make another croſs it. You will thus be able to take out the *Cerebrum* intire, which you may afterward prepare for a Demonſtration according to the *Varolian* Method, as ſhall be ſhewn in the ſeventh Chapter.

CHAP. V.

Of the Adminiſtration of the MEMBRANES *of the* BRAIN.

THE Membranes of the Brain are two, *viz.* The *Pia* and *Dura Mater*; but the laſt comes only under a Diſſection; the firſt, on account of its cloſs and immediate Connection with, and its various Inſinuations into all the Circumvolutions of the Brain, cannot be ſeparated from it. The Subſtance of this Membrane, which is extended round the Nerves like a Cobweb, may be ſeen after the Brain is taken out. It is thereſore the DURA MATER which comes under the Knife, in which you will ſee a great Number of minute Blood Veſſels iſſuing out Blood while the Skull is taking off. Having obſerved theſe Veſſels, make an Inciſion on each Side of the *Falx* in the *Du-*

ra Mater, but not in the Middle, on account of the longitudinal *Sinus* and *Falx* under it; inſert into this Inciſion a ſharp-pointed Pair of Sciſſars, and cut through the Membrane both backward and forward, as far as you can reach with the Points of the Sciſſars. Repeat the ſame Operation on the other Side of the *Falx*; afterward make another Inciſion in each Side of the Membrane, from about the *Vertex* to the Ear, and thus you will divide the *Dura Mater* into four Parts, which turn down upon the Sides.

The FALX, which is a Duplicature of the *Dura Mater*, divides the *Cerebrum* into two Parts, and adheres anteriorly to the *Criſta Galli*, from which it muſt be ſeparated, and, after having torn aſunder the minute Blood Veſſels which join it to the *Cerebrum*, turned down upon the *Occiput*, while you are diſſecting the *Cerebrum*. You are next to trace the *Sinus's* of the *Falx*, which are two, one, or the leſſer, running along its inferior Edge; the other, or greater, upon its ſuperior Edge to the *Torcular*. Diſſect this *Falciform*, or *Sythe-like* Membrane, at the Extremities of each Side, by an oblong, and ſomewhat oblique Inciſion, and trace its larger *Sinus* with a Probe, which, when found, lay it open with a Knife or a Pair of Sciſſars. If you diſſect the inferior *Sinus* in the Middle, and inflate it with a Blow-pipe toward the anterior Part, you will, by the Immiſſion of the Air, obſerve ſeveral Divarications or Branches, which make a Communication between the inferior and ſuperior *Sinus*. The upper *Sinus* continues its Courſe till it meets with the reſt, and ſo conſtitutes Part of the *Torcular*; you are therefore to purſue the Courſe of this *Sinus* as far as the Probe will go, with going to either Side in your Inciſion, which will direct you to the other three *Sinus's*; one going in a ſtreight Line with the former for ſome ſmall Space toward the *Foramen Magnum* of the occipital Bone; the other two ſituate at the Sides oppoſite to each other, which muſt be ſeparated with the Knife like the larger *Sinus* of the *Falx*. Having traced their Extremities, you will find them terminate in the internal Jugulars; hence it appears, that theſe Cavities are only certain Dilatations of the Jugular Veins, which hereabout degenerate into Membranes.

A farther Obſervation is yet to be made of the *Dura Mater*, *viz*. That it does not adhere alike to all Parts of the Skull; for on the ſuperior and lateral Parts it is only joined by ſome minute Blood Veſſels and Fibrils, therefore in theſe Places more eaſily ſeparated; but it adheres ſo firmly in its inferior Part, as not to be ſeparated without being torn in Pieces.

CHAP. VI.

Of the common Method of diſſecting the BRAIN.

ANATOMISTS diſſect the Brain three different Ways; ſome, in Imitation to *Varolius*, begin at the Origine of the Nerves; others at the ſuperior Part, and diſſect either the whole *Cerebrum*, or one Side of it, according to *Fr. Sylvius*.

The common Method is firſt to ſeparate the *Falx* from the *Criſta Galli*, then from the Sides of the *Cerebrum*, and lay it back towards the Neck; afterwards cut off, at one Section, with a broad fine Razor, a Piece from the *Cerebrum*, about two Inches Breadth, to come at the Ventricles; but the largeſt Part muſt be cut off towards the *Occiput*, for there the Ventricles lie deepeſt. In this firſt Inciſion you will obſerve minute Blood Veſſels through the Subſtance of the Brain like red Points; but if you do not yet ſee the Ventricles, make another Inciſion, and cut off by Degrees thin Slices of the Brain, till you come at them, which will firſt make their Appearance in the anterior Part of the Brain, becauſe they are there placed ſomewhat higher than any where elſe. If, by making a tranſverſe Section, you diſcover a ſmall Apperture, trace its Courſe toward the anterior and poſterior Part of the *Cerebrum*; that Part which goes towards the Forehead, is about two Inches Diſtance from its Extremity, and that which points to the *Occiput* reflects toward the Forehead; but it forms firſt a Kind of a hollow, like a *Sulcus*, in the *Occiput*, about an Inch diſtant from its Extremity, ſo that the Length of this Cavity is about two Hands-breadth. It afterward returns along the external Side to the anterior Parts, from whoſe Extremity, toward the *Os Temporis*, it declines about an Inch; it always goes deeper and deeper, ſo that above the *Os Petroſum*, near the Paſſage of the auditory Nerve, where the Ventricle terminates, the Brain, under the Ventricle, is only about the thickneſs of a Pea, or an eighth Part of an Inch; hence it is that you are to cut off a larger Portion of the *Cerebrum* on the Sides than near its Middle, where the *Falx* is ſituate: For under the *Falx* lies the FORNIX, or that white Body, which, being built like an Arch upon the third Ventricle, divides the lateral Ventricles. This may be cut off, if you thruſt your Knife pretty deep, and cut off in the Middle a greater Portion of the Subſtance of the *Cerebrum*. That Part, which is in the Middle, between the Sides of each Ventricle, and incloſed, as it were, by the ſurrounding Ventricle, is called the *Corpus Calloſum*, to whoſe Sides is joined the *Plexus Choroides*, ariſing at the End of the Ventricle from the Carotide Artery, with ſome adjacent Glands, and taking its Courſe round the *Corpus Calloſum*, receives a ſmall Branch from the Cervical Artery. Having cut off its Origine, and ſeparated it from the Limb of the Ventricle, you will obſerve under it a ſmall Artery, beautifully diſtributing its Branches to the Surface of the Ventricle. Raiſe now the *Fornix*, and you will ſee under it the *Septum Lucidum*, which is only the inferior Part of the *Fornix*; then cut off the *Crus* in its anterior Part, and turn it toward the *Occiput*, that you may obſerve the two poſterior *Crura* creeping along the lateral Ventricles. Under the *Fornix* you will find the third Ventricle, riſing from the Union of the two lateral ones, which has two *Foramina*, one placed anteriorly near the *Infundibulum* and pituitary Gland, called the *Vulva*; the other, in the poſterior Part, and tending toward the fourth Ventricle, termed the *Anus*, having two Protuberances, one on each Side, denominated the *Teſtes*, and above it the *Pineal Gland*, which *Des Cartes* ſuppoſed to be the Seat of the Soul, and is eaſily diſtinguiſhed by its cineritious Colour. Some very improperly call it the *Penis*. In the ſame Place are two other Protuberances called *Nates*. Having taken a View of all theſe Parts, you are to paſs your Probe into the fourth Ventricle, which deſcends downward, and following the Tract of the Probe with the Knife, cut into the Subſtance of the *Cerebellum* till you come to the Ventricle. After having obſerved this Ventricle, return to its anterior

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anterior Part, and gently raiſe the Proceſs of the *Cerebrum*; but firſt ſeparate the *Mammillary Proceſſes* from the *Os Cribroſum*, and then lift up the *Cerebrum*, to ſeparate the Nerves in their Order riſing within the *Cranium*. Firſt, cut off the *Optic Nerves*, between which and the following Pair you will find the Carotide Arteries paſſing along the Sides of the Skull, and diſtributing themſelves into an infinite Number of Branches upon the *Pia Mater*: Theſe you are likewiſe to ſeparate, and, if poſſible, the *Pituitary Gland* along with them, which paſſes through the *Dura Mater* under the Optic Nerves; then the *Nervi Motorii Oculorum*, and a ſmall Nerve which goes to the Tongue, with another immediately after it, which likewiſe goes to the Tongue, and climbs over the *Os Petroſum*; next, the *Nervi Auditorii*, with the *Par Vagum*, which Nerve being firſt divided into a great many Filaments, ſlides out of the Skull near the Entrance of the internal Jugular; and laſtly, the *Ninth Pair*, which make their Entrance out of the Skull near the ſpinal Marrow. When you are cutting theſe Nerves aſunder, take Care not to pull out the Brain with too great

Force, for then you will rend the Nerves, which are more tender near their Origine than in their Progreſs. The next Thing you are to mind, is to cut them off cloſs to the Skull, and not break their Filaments; for there are ſome Nerves, which are divided into ſeveral Filaments before they go out of the Skull, as has been obſerved. After having taken a View of, and diſſected all theſe Particulars, you are now to return to the *Occiput*, and take out the *Cerebellum*; to execute which, raiſe up the *Cerebrum* a little, and then make three Inciſions into its Membrane, which ſeparates it from the *Cerebellum*, one in a ſtreight Line to the *Occiput*, and the other two obliquely to both Sides; but take Care not to hurt the Bone, for fear of cutting the *Sinus's* of the *Dura Mater*. In this Vault the CEREBELLUM is ſo ſituate, that it cannot be viewed till taken out; therefore put in at one Side of it a broad Iron *Spatula* or Spoon, and ſo take it out of the *Dura Mater*. You will obſerve under it the *Proceſſus Vermiformis*, ſituate at the Root of the ſpinal Marrow, between the two Lobes of the *Cerebellum*, at whoſe Sides are two, and ſometimes more Protuberances, which make the PONS according to *Varolius*. Laſtly, having pulled off the ſpinal Marrow, take out the Brain, which is the common Method of diſſecting it.

CHAP. VII.

Of the VAROLIAN *and* SYLVIAN *Method of diſſecting the* BRAIN.

AS *Conſtantius Varolius* invented a new Method of opening the Skull, ſo has he contrived another Way of diſſecting the Brain different from that of the common; for, after diſſecting the Skull, he takes out the Brain whole, and, turning it upſide down, begins the Diſſection on that Side where the Nerves take their Origine. I told you before, that the *Varolian Method* of diſſecting the Skull, renders it unfit for framing a Skeleton, and makes the Operation more difficult, ſince the Brain may be as well taken out intire by a circular Section round the *Cranium* as otherwiſe, which has been already ſhewn in the fourth Chapter. Therefore, to perform neatly the Adminiſtration, you may put the Brain inverted into the Inſide of the *Os Verticis*.

By this Method of diſſecting, you will be able to make more curious and accurate Obſervations than in the preceding one. The firſt that comes under Conſideration is the Fiſſure of the *Cerebrum*, which divides it into ſeveral Parts. To trace its Extremity, you are, with the Point of the Knife, to cut aſunder the minute Ramifications of the Veins, which lie interſperſed there. The next is the *Pia Mater*, ſtretched here over the Nerves like a Cobweb, and perforated in ſeveral Places. When this Membrane is rent, you will ſee the *Anaſtomoſis* of the Carotide and Cervical Arteries, by Means of an interveening Branch, which muſt be cut off. You here will obſerve ſome very minute Blood Veſſels, or rather Fibres, here and there expanded, which have their Origine from the Carotide and Cervical Arteries, whoſe Contexture is called the *Rete Mirabile*. The Cervical Artery, being contiguous to the ſpinal Marrow, and divided like the Greek Letter Υ, is alſo here to be ſeen. You may take a View of the *Pituitary Gland*, but the greateſt Part is generally left behind in the *Sella Turcica*, and the *Infundibulum*, ſituate behind the Union of the Optic Nerves. Separate theſe from the Optic Nerves, and find out the *Foramen* leading to the third Ventricle, then cut the Optic Nerves in the Middle, to ſee the Place of their Union and Communication, afterward trace their Cavity, if they have any. You are next to ſearch for the Ventricles after the following Manner. Search for that Branch of the Carotide Artery, which, along with the Optic Nerve, enters the Subſtance of the Brain, and this will direct you to the lateral Ventricle; for both the Carotide Branch and Optic Nerve enter this Ventricle, and the laſt creeps along its Sides, near the *Corpus Calloſum*. But you cannot yet have a full View of the whole Ventricles, on account of the anterior *Crura* of the ſpinal Marrow, you muſt therefore here ſtop a little, and take the fourth Ventricle in your Way. Wherefore, raiſe gently the *Medulla Oblongata*, ſeparate it with the Point of the Knife from the *Cerebellum*, and here you will ſee below the *Proceſſus Vermiformis*, with the *Pons Varoli*; then you will eaſily come at the fourth Ventricle, whoſe interior and poſterior Surface exactly reſembles the Uterine Cavity. If the ſpinal Marrow is a little raiſed, you will ſee in this Ventricle a *Foramen* leading to the third, and reſembling a writing Pen, hence called *Calamus Scriptorius.* Probe this *Foramen* gently, and then cut aſunder the ſpinal Marrow in the Middle, where Nature herſelf has chalked out the Way by an Interſtice, which divides it into two Parts by a red Line. Having made this Diviſion, you will ſoon obſerve the third Ventricle, which is to be opened with the Knife; and then you will ſee its whole Cavity, the *Septum Lucidum*, *Fornix*, and the Avenue to the lateral Ventricles. Having made your Obſervations here, cut off the *Crura Medulla Spinalis* that go to the Brain, and lay them aſide with the *Cerebellum*; which done, you will have a more clear View of the Figure and Shape of the lateral Ventricles, reſembling, in ſome Meaſure, a Horſe-ſhoe, were it not for the Proceſs in the Middle.

Having left the *Cerebrum*, diſſect the *Cerebellum*, beginning on that Side where the fourth Ventricle has ſmall *Sinuſes*; if it is here divided exactly in the Middle, you will, beſides theſe ſmall Branches coming from the *Medulla Albicans*, obſerve in that white Body a different Colour, inclining to a yellow, and repreſenting a folded Hand, with the little Finger cut off. The *Laminæ* of the *Cerebellum*, after having removed the exterior Coat ariſing from the *Pia Mater*, may be ſeparated from each other with the Back of the Knife.

The SYLVIAN *Method.*

In this one Half of the *Cerebrum* is diſſected, according to the common Method, and the other on the oppoſite Side, according to the *inverſe Method*, which indeed is the moſt convenient and beſt Way that has yet been invented, becauſe it exactly demonſtrates thoſe Parts which are but ſeen in the inferior Side of the *Cerebrum*, and at the ſame Time you do not neglect obſerving thoſe Parts ſituate on its upper Part. The Manner of performing this Operation is the ſame with that of the other two Methods jointly conſidered; for any one of the Sides may be diſſected after the common Method, and the other being afterward taken out, and turned upſide down, diſſected according to the *inveſted Method.* As there is but only one Side here to be diſſected, there muſt ariſe ſome Difference between it and the former; but wherein this Difference conſiſts, I ſhall explain in a few Words. In examining the Ventricles, the only Difference is, that the *Falx* is not ſeparated from the Ventricles, nor from the *Cerebrum*, except on one Side, but ſo as to keep its natural Situation. Having found and opened the Ventricle, you proceed as before till you come to the *Fornix*, the *Crus* whereof muſt neither be cut off nor laid back, but only raiſed, to ſee the third Ventricle, and make your Obſervations as before. You are not now to touch the fourth Ventricle, but immediately endeavour to take out the *Cerebrum*; therefore, lay the remaining Half of the *Cerebrum* on one Side, to ſee the Origine and Progreſs of the Nerves; which being ſeparated, take out the *Cerebrum*, and proceed with the Operation after the *inverſe Method* already mentioned; for the Difference is not ſo great as to require any particular Directions.

You have here three different Methods of diſſecting the Brain, now practiſed by the moſt eminent and accurate Anatomiſts; out of which you may chooſe that you moſt approve of: But, if I am to give my Opinion, I would prefer the laſt; however this I will leave to every one's Judgment, and now proceed to the Eye.

CHAP. VIII.

Of the Method of diſſecting the EYE.

THE Eye being one of the moſt noble Organs of the Body, is therefore placed within a bony Socket, and and fortified by ſeveral Sorts of Fences againſt any foreign Attack. It is externally ſurrounded by the Eye-lids, whoſe extreme Circle, being ſomewhat hard to the Touch, is called the *Tarſus*, in which are fixed a Row of Hairs like ſo many Palliſadoes, termed *Cilia*, or the Eye-laſhes. The *Muſculus Orbicularis* aſſiſts in the Compoſition of the Eye-lids, of which already in the ſecond Chapter. When the *Cilia* are raiſed, you will ſee the *Tunica Albuginea*, denominated likewiſe *Adnata*, becauſe of its Adheſion to the *Cornea*, which appear full of Blood Veſſels, when there is too large a Quantity of Blood lodged in the Head, either on the Account of a *Plethora*, or a Stoppage. The Eye being thus fixed in its bony Cavity, requires therefore a nice and a careful Hand to take it out from thence.

This Operation muſt either be performed when the Skull is intire, or when diſſected; the firſt is the moſt difficult, and yet more often made uſe of; the laſt is put in Practice when we want to trace the natural Situation and Origine of the Muſcles of the Eye, with the Egreſs of the Optic Nerve; to accompliſh which, I will lay down the following Directions.

Having removed the frontal Muſcles, with thoſe of the *Palpebræ*, and opened the Skull, ſeparate the Eye-lid from the Eye-brow, and the *Perioſteum* from the upper Edge of the Orbit. But the Diſſection of the Brain ought to precede this, becauſe its Proceſſes will hinder your Operation; therefore cut it off at the Optic Nerves, then ſaw off what remains of the *Os Frontis*, which muſt be done twice, by fixing your

Saw firſt above the *Canthus Major*, and next above the *Canthus Minor*; but while you are uſing the Saw, depreſs the Eye, and puſh it to either Angle, that it may not be cut, or become a Hindrance to the Operation. When the thickeſt Part of the Bone is ſawed through, you may divide the thinner oſſeous *Lamina* above the Eye with a ſtrong Inciſion Knife, and remove it; thus you will ſee the Eye denudated, from which firſt ſeparate the *Perioſteum*, then the Fat by Degrees, till quite removed. You are here to take particular Care of the *Muſculus Trochlearis*, or *Obliquus Major*, that moves the Eye obliquely; for it paſſes through the Cartilage which is fixed to the ſuperior Part of the *Canthus Major*; this Cartilage therefore muſt not be cut off. Having ſeen the natural Situation of the Muſcles of the Eye, and their Origine about the Optic Nerve, you may eaſily take out the Eye, by cutting aſunder the Optic Nerves, *Motores Oculi*, and the *Palpebræ*.

But the greateſt Difficulty is to ſeparate the Eye from the *Canthus* without hurting the Bones; however, to ſhorten your Work, and carefully perform your Operation, take the following Directions. When the

Eye is ſeparated from the upper Bone, pull it out gently downwards, then with a blunt Knife ſcrape off every where the *Perioſteum* in ſuch a Manner from the Orbit, that the *Trochlea*, ſituate on the ſuperior Part of the inner *Canthus*, may, at the ſame Time, be removed; which, if not done with Care, will be eaſily loſt. In the greater Angle take away the lachrymal Caruncle, with the Eyelids, likewiſe the lachrymal Gland, compoſed of a great many ſmall ones, and placed under that Depreſſion in the ſuperior Part of the Orbit, near the leſſer Angle; but this cannot be done, if the *Perioſteum* is not removed in the Manner above deſcribed. When the Eye is freed on all Sides in order to be taken out of the Orbit, put in a double Hook in ſuch a Manner into the Orbit, that both Points may take hold of the Middle of the Optic Nerve, which being ſtretched, by pulling the Hook toward you, may be eaſily cut through by a pointed Knife, like the *Greek* Γ; but if you have not ſuch a one, make uſe of your diſſecting Knife, and, with the Point thereof, endeavour, after having puſhed the Eye towards the Noſe, to cut off the Optic Nerve, with the ſurrounding Muſcles; but if this will not do, turn the Eye back from the Noſe, and cut the Optic Nerve on the oppoſite Side, till the Eye can be extracted.

If you obſerve the Eye after taken out, and before the *Perioſteum* is removed, it will repreſent the Figure of a Pear. We are to conſider in the Eye, beſides the Muſcles, Glands and Fat, the Coats and Humours. The firſt Coat is the *Adnata*, which is ſeen upon opening the Eye-lids, of which already. You may eaſily ſeparate this Coat with the Fat, then the lachrymal Gland, and keep it for a Demonſtration. You are now to enter upon the Muſcles; and firſt, you are to ſearch for the *Obliquus Major*, which may ſoon be diſcovered by handling the *Trochlea*. Separate this Muſcle before you enter upon any of the reſt, becauſe you will ſoon loſe it if you do not. Clear next the Optic Nerve of the Fat and Muſcles near the Globe of the Eye, and make thereon a Ligature, that you may ſuſpend it in ſome convenient Place; when this is done, free the firſt Muſcle that comes in your Way of the Fat, then the ſecond and third, and ſo with the reſt, till they are finiſhed. Theſe Muſcles, being ſix in Number, are all inſerted into the *Tuni-*

ca Sclerotica, and afterwards become carnous, except the *Obliquus Major*, which is furniſhed with a long Tendon, wherein you may take notice of the *Cartilaginous Trochea*, which is peculiar to that Muſcle. Having raiſed the Muſcles, remove the Fat along with the *Adnata*, that the anterior Part of the Eye may be intirely clear; then cut off the Muſcles; from whoſe Tendons, when expanded, ariſe the *Membrana Innominata*, which covers the Fore-part of the Eye to the *Cornea*, and is ſeparated with the Tendons of the Muſcles.

When theſe two Coats, or rather Membranes, are removed, proceed to the reſt; the firſt of which is white, and called, on account of its Hardneſs, *Tunica Sclerotica.* This covers the whole Eye externally, but degenerates in the Fore-part, and becomes tranſparent, hence called *Tunica Cornea.* This muſt be removed before you can come to the interior Parts, which may be done either by making a circular or a croſs Inciſion. If you intend to preſerve the *Cornea* whole, make a circular Inciſion, if not, a croſs one will do. Take hold of the *Cornea* between two Fingers of your Left-hand; one of which place at the *Cornea*, and the other at the Optic Nerve; then cut the *Tunica Sclerotica* acroſs, if you deſign to preſerve the *Cornea* whole; if not, put your Fingers to the Sides of the Eye, and gently compreſs it if flaccid, and make a croſs Inciſion in the *Cornea*. Introduce next your Sciſſars ſoftly, either within the *Sclerotica* of the relaxed Eye, for fear of wounding the *Uvea*, and cut it through in a Line parallel with the *Cornea*; or introduce your Sciſſars gently between the *Cornea* and the cryſtalline Humour, and continue your Section to the Optic Nerve; then ſeparate the *Sclerotica* carefully from the Edge of the *Uvea*, where it ſurrounds the *Pupilla*, ſo as not to hurt the ſubjacent Coats, which would occaſion an Efflux of the Humours. The remaining Part of this Coat is eaſily ſeparated from the *Uvea*. This Membrane owes its Origine to the exterior Coat of the Optic Nerve, which ariſes from the *Dura Mater*, as is plain from occular Demonſtration; for if the Section be continued through the *Sclerotica* and the external Coat of the Optic Nerve, then this laſt, being contiguous to the *Sclerotica*, may be ſeparated with it round the Globe of the Eye. Having removed this Coat, the *aqueous Humour*,

mour, ſituate before the cryſtalline, ought firſt to be demonſtrated, becauſe, being of a fluid Nature, without any ſolid Conſiſtence, is immediately ſpilt upon cutting open the *Tunica Cornea*, or *Sclerotica.*

You now return to the reſt of the Coats; the anterior Part of the firſt that preſents itſelf, is called the UVEA, and the poſterior, the CHOROEIDES. This you are to diſſect longitudinally, and gently ſeparate the Edges of your Inciſion from the *Retina*, which is an exceeding thin Membrane, therefore liable to be hurt, if not minded. Make an Inciſion in the *Pupilla*, becauſe it more firmly adheres there than in any other Part; then ſeparate it ſo far, that the Humours, with their Coats, may have a free Exit; for the *Pupilla* being once removed, there is no Occaſion for a farther Separation. This Coat has alſo its Origine from the interior *Involucrum* of the Optic Nerve, which being diſſected, the *Medulla* will ſoon appear; therefore you need not give yourſelf any farther Trouble, but to ſqueeze out this medullary Subſtance, and leave the Coat empty.

The third Coat is the *Retina*, which ſome imagine takes its Riſe from the *Medulla*, becauſe

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cauſe it reſembles it in Softneſs: It cannot be eaſily ſeparated from the *Uvea*, therefore they are generally both together ſeparated from the *Tunica Vitrea*. The laſt two Coats are the *Tunica Vitrea* and the *Tunica Cryſtallina*; the laſt of theſe ſurrounds and contains the Cryſtalline Humour, and the former the Vitreous, ſo as not to be ſeparated; yet if you touch either of them with the Point of the Knife, they ſoon ſhew themſelves, eſpecially the cryſtalline, of which if you ſcrape off the leaſt Quantity, it produces an Inequality on the Surface of the Humours.

Yet theſe Humours muſt be ſeparated from each other, which requires a great deal of Attention. Separate therefore carefully the *Pupilla* from the cryſtalline Humour, then cut with the Point of the Knife the *Fibrillæ* between the cryſtalline and vitreous Coats, and ſqueeze out the vitreous Humour, by putting your Fingers under the cryſtalline. If you would ſee the natural Situation and Figure of all the Humours, take the Eye out of the Orbit in a froſty Seaſon, and, expoſing it to the cold Air, leave it till the Humours are frozen and condenſed by the Cold; afterward divide the Eye with the Knife into two equal Parts, and thus, among the reſt, you will have a full View of the aqueous Humour, which otherwiſe runs off immediately upon the Diſſection of the *Tunica Sclerotica*.

CHAP. IX.

Of the Method of diſſecting the EAR.

THE Ear, or Organ of Hearing, is commonly divided into external and internal. By the external Ear is meant all that which lies without the external Orifice of the *Meatus Auditorius* in the *Os Temporis*; and by the internal, all that lies within the Cavities of the Bone, or bear any Relation thereto.

In the external Ear we have only at preſent the Muſcles to conſider. When taking off the Skin of the Head, I deſired you to have a particular Regard to theſe Muſcles, of which there are two Pair, one for pulling the Ears upwards, and the other for drawing it downwards. The firſt, called *Levator* or *Attollens*, is ſituate above the Ear on the

Temple Bone, and being very thin, therefore eaſily ſeparated along with the Skin. It is about an Inch in Breadth, and of an oblong round Figure, narrower at the Ear than any where elſe. The Way to ſeparate this Muſcle is obvious.

The ſecond Pair, termed *Retrahens*, is placed behind the Ear upon the Temple Bone, and being of the ſame Subſtance and Magnitude with the former, is eaſily ſeparated after the Skin is taken off. If you incline to take a View of the external Part of the Ear, you may ſeparate the Skin which covers it, and then cut off the Cartilage from the Bone.

In the internal Ear a great many Parts lie hid, and cannot be ſeen till the Skull is broken, and the *Os Temporum*, with the *Os Petroſum*, ſeparated from the other Bones with which they are connected. But while you are ſeparating the Bones of the *Cranium*, take Care not to uſe too much Force, for fear of hurting the internal Ear, ſo as to break either the *Tympanum*, or put the auditory Bones out of their Places. When this is done, and the Ear cleaned, take a View of the *Tympanum*, and if ſharp-ſighted, you may ſee the *Malleus* through the tranſparent

Membrane. Then with a *Forceps* break that Part of the Bone placed toward the *Os Frontis*, to ſee the Entrance of the *Meatus Auditorius* into the *Os Petroſum*, and take away one Half of it to get a full View of the Situation of the ſmall Bones in the *Concha*; but take Care not to hurt the *Os Petroſum*, becauſe the Labyrinth and Cochlea lie concealed in it. You will here meet with the *Muſcles of the internal Ears*, which ſerve to move the *Malleus*.

Having removed the ſmall Bones, apply the Saw to the *Os Petroſum*, for it is too hard to be managed with the Knife. I could rather wiſh to ſhew the Method of performing this Operation by ocular Demonſtration than Words, becauſe it is very difficult; however, I will endeavour to explain it as well as I can.

I divide the *Os Petroſum* into three Sides; in the firſt is that *Foramen* through which the Optic Nerve paſſes; the ſecond, next to this, is that which is ſeen in the internal Part of the Skull when whole; and the third is directly oppoſite to the firſt toward the *Concha*, and in it may be ſeen the *Feneſtra Ovalis*. You are now to cut through the oſſeous *Lamina* with a fine Saw, which covers the third Side; and then you will firſt obſerve the *Ductus Cochleatus*, oppoſite to the *Foramen*, formed for the Paſſage of the auditory Nerve; but it does not lie directly oppoſite to it; for the *Cochlea* is nearer the *Os Temporis.* If a little more of the *Cochlea* is ſawed off, you will alſo ſee the two Paſſages of the Labyrinth, meeting above the *Cochlea* above the ſame *Foramen.* If you have not ſawed through the whole Canal of the *Cochlea*, you may make a further Opening with a File; becauſe it is not equally prominent in all Places. Having intirely laid open the *Cochlea*, you will meet at its Extremity, with a larger Cavity, where you will ſee the Contortions of the Labyrinth meet, and the *Feneſtra Ovalis.*

You are now to trace the ſerpentine Canals of the Labyrinth, which are three in Number, and all meet in one Place. When you diſſect this, you ought to have before you ſuch another Bone already diſſected, in order to regulate your Operation accordingly; but for want of ſuch a one, I will endeavour to point out, in as plain a Manner as I can, the Place where you are to make your Beginning. In the ſecond Side you will ſee a ſmall Protuberance, near the *Os Temporis*; under this lies one of the Canals, which is a Kind of a Baſe to the Triangle; for ſuch is the Poſition of theſe Canals, that on that Side where they face the *Os Temporis*, they make an equilateral Triangle; but theſe three Canals, taken together, reſemble a Triangle, whoſe *Vertex* is at the *Cochlea*, and Baſe near the *Os Temporis*. You may know the Situation of the reſt by this Figure; therefore, to ſeparate them, remove that which is between the abovementioned Canal and *Os Temporis*. The exterior hard *Lamina* muſt be broken with a Hammer, and the remaining ſpungeous Subſtance may be cut off with a Knife. Between theſe Canals alſo, which are incloſed in a hard and ſolid Bone, lies a ſpungy Subſtance, which fills the empty Spaces; this muſt be removed with the Knife, that each of theſe Canals may be ſeen. Theſe Canals muſt likewiſe be laid open, this may be done, by ſcraping the Bone, if green and ſoft, with a Knife, but if dry, you muſt uſe a File. You may enlarge a little the *Foramina* which appear in the filed Bone, and may protract them on both Sides till they meet; if you do not approve of this Method, convey a Hog's Briſtle through each Canal, ſo as that it may find its Exit at the *Feneſtra Ovalis.*

This Operation requires not ſo great an *Apparatus* in the Head of a *Fœtus*, becauſe the Bones being ſoft and tender, may be diſſected with the Knife, without the Help of a Saw.

BOOK IV.

Of the EXTREMITIES.

The INTRODUCTION.

WHILE I am prefixing this Title, I think proper to inform my Reader, that I not only intend to explain the Muſcles belonging to the Extremities, but almoſt all thoſe of the human Body that have not been mentioned in the Diſſection of the Cavities; *viz.* The Muſcles of the Loyns, Back, Neck, and Head; therefore this Book may be denominated *Myotomiæ & Myographiæ Specimen.* As the Muſcles are the Subject of this Book, I think it will not be taken amiſs, if I ſhould here introduce two or three Sentences taken from *Riolan* and *Galen* concerning them.

Riolan ſays, *That he who is well acquainted with Myography, will eaſily underſtand Myotomy, and be able of himſelf to manage this Part of Anatomy, which ſome think the moſt difficult, if he obſerve the Method I am going to preſcribe.*

It is certain the Adminiſtration of the Muſcles is not a difficult Operation, if the Adminiſtrator will trace and obſerve the Order in which they follow one another in the Body. If therefore you will keep in the Path I ſhall now chalk out, and conſult *Euſtachius*'s, *Couper*'s, &c. Tables, you need not fear coming ſafely to your Journey's End. I muſt likewiſe deſire you to cut off, and throw aſide all the Muſcles, when ſeparated, except you intend to reſerve them for a Demonſtration; becauſe, if left hanging at the Body, they will be troubleſome, and obſtruct the Work.

Becauſe the Adminiſtration of the Muſcles was alſo chiefly inſtituted to know the proper Action of every Muſcle, I ſhall here, in general, ſhew you from *Galen*, in

what

what Manner you are to come at this Knowledge.

Mind, ſays he, *how this is to be done*; *for the following Diſcourſe is intended to treat of the Method of diſſecting a dead Creature, that you may thereby underſtand the Motion of every particular Part of it when alive. Cut off therefore all the Fleſh from thoſe Bones you intend to examine, leaving untouched only thoſe Muſcles which are the Inſtruments of their Motions. But when you have raiſed theſe Muſcles to their Extremities, they alſo muſt be ſeparated from the Bones, from which they take their Origine, keeping them extended in the ſame Poſition as they were before. If this Operation is performed as it ought to be, you will plainly perceive the Motions of the Bones which have ſuch Muſcles inſerted in them.*

He brings the Digaſtrick Muſcle of the lower Jaw as Proof of confirming what he has advanced, ſaying, *If you cut off its Origine, and diſſect its whole Body to the Chin, without touching that Part inſerted into the lower Jaw, and if you afterward pull this Muſcle toward the Place of its Origine, that Part inſerted in the lower Jaw will follow, and the Mouth will be opened. Theſe Operations muſt* *be performed after the Skin is intirely removed, and but for a ſhort Time after the Death of the Subject, while the Ligaments of the Articulations and Muſcles continue ſoft and flexible. The Functions of every Muſcle may likewiſe be examined, when all the other Muſcles are removed, except that under Conſideration and that which acts in Oppoſition to it.*

What has been ſaid concerning the Method of finding out the proper Action of every Muſcle will be ſufficient. I will now return to the Conſideration of the Extremities, which are of two Kinds. But though they are of two Sorts, as the *Hands* and *Feet*, yet the infinitely wiſe Creator and Architect, has alſo made a Pair of each; therefore, to avoid Repetition, I will only conſider the Extremities of one Side, becauſe the Operation is almoſt the ſame on either Side.

CHAP. I.

Of the Method of raiſing the Skin and Fat from the HAND *and* FOOT.

I Begin with the Hand, becauſe more uſeful than the Foot; but it muſt be firſt cleared of its Skin, before you can diſſect the Muſcles.

I told you in the ſecond Book, that an Inciſion muſt be made in the Skin to the Middle of the *Humerus*, before you could ſee the Inſertion of the pectoral Muſcles. Begin your Inciſion at the End of this Section, and continue it along the Middle of the Arm above the Flexure, where the Median Vein creeps under the Skin, which take Care not to cut; then carry on your Inciſion along the Outſide to the Extremity of the Thumb: Afterward ſeparate the Skin of the Arm from the Fat as far as the Hand, according to the Directions already given. At the Top of the *Cubitus* or *Olecranon*, there is a Membrane ſo cloſely united with the Skin, as to render it very difficult to be ſeparated in that Place. Becauſe there are a great Number of Veins creeping under the Skin, you muſt take particular Care that they be not wounded while raiſing the Skin, which would prevent your ſeeing the beautiful Diſtributions and Divarications of the ſubcutaneous Branches.

And becauſe there is a greater Variety in diſſecting the Hand than the Arm, I will therefore treat of it more particularly in a few Words. Having made an Inciſion in the external Side of the Thumb according to the Directions given, make one in the internal Side parallel to it; and, in the ſame Manner, make a double Inciſion in each Finger, except the little one, the inner Side of which you need only open lengthwiſe. Having made theſe Inciſions in the Skin, firſt ſeparate it from the Inſide of the Fingers, then from the Palm of the Hand, where you are to obſerve, that the nervous Expanſion of the *Palmaris Longus* is interwoven with the Fat, and adheres ſo cloſe to the Skin of the Palm of the Hand, as ſcarce to be ſeparated, unleſs it be by a dextrous and experienced Hand; by beginning the Separation at the Roots of the Fingers, and proceeding towards the Flexure of the *Carpus*, always taking Care not to cut the Tendon of the Muſcle, which was often done in *Galen*'s Time. However, *Galen* never ſeparated the Skin of the Hand, but took it off intire; and it was owing to this that he found out the Tendon, which had been before neglected. In diſſecting the Fingers, take Care not to cut the Blood Veſſels and Nerves, which only run along their Sides. Having taken off the Skin on the Inſide, turn the Hand, and take the Skin alſo off the Outſide. Having made an Inciſion round the Roots of the Nails, ſeparate them from the Bones, by putting the Knife under them; then take them off along with the Skin, and, being divided into ſmall leathern Thongs, they will diſcover their genuine Origine.

So much for the Skin, under which the Veins run along, being ſometimes ſo overrun with Fat, that they are ſcarce viſible, unleſs cleared of it. To perform this Operation, begin near the axillary Veins, and free them there of the Fat; from thence proceed towards the Extremities, but take Care not to cut the Branches ariſing from the larger Veſſels. Perhaps you will ſay, I ought to ſhew you how to avoid them; but that is not ſo eaſily done as ſome imagine, becauſe theſe Branches take a different Courſe in different Subjects; therefore it muſt be your Buſineſs to perform every Part with the greateſt Exactneſs and Attention. But to proceed, the Veins muſt be cleared of their Fat after the following Manner. Whenever you obſerve a Tract of a Vein, make a longitudinal Inciſion into the Fat, lift up the Vein with a Hook, ſeparate the extended Fibres under it with the Point of the Knife, till the Vein is cleared, and then remove the Fat; or make an Inciſion in the Fat, where it is free from the Vein, and then ſeparate it from the Muſcles. But where you meet with Veins, make a longitudinal Inciſion in the inner Membrane of the Fat; and for the reſt, proceed as has been directed. The Cephalic and Hepatic Veins march along the external Parts; but as you met with ſome Difficulty in raiſing the Skin of the Hand, ſo you will find the ſame in removing the Fat there; becauſe the *Tendo Palmaris* is ſo deeply interwoven with the Fat in the Palm of the Hand, that one cannot be removed without the other. On the Back of the Hand there is only a viſcid glutinous Subſtance, which does not deſerve the Name of Fat, yet this rather increaſes than diminiſhes the Difficulty of the Operation. The Veins, being here likewiſe flaccid and empty, on account of the Return of the Blood to the Heart, are not eaſily ſeparated from the Membranes; wherefore this Operation muſt require a great Deal of Labour, Aſſiduity, and Patience: For the reſt, proceed as above.

The Skin of the Arm being taken off, turn the Body on its Face, and then ſkin the Back till you ſee the *Apices* of the *Vertebræ* of the Back, likewiſe the Extremity of the *Os Ilium* and the *Glutæus Maximus*, or which is the ſame, till you have denudated Half the Back: The Fat muſt likewiſe be ſo far removed.

CHAP. II.

Of the MUSCLES *of the* SCAPULA.

THE *Scapula*, or *Homoplata*, is that broad Bone which lies upon the Back, ſerves for the Articulation of the *Humerus*, and is moved different Ways by five Pair of Muſcles, *viz.*

1. *Serratus Minor Anticus.*
2. *Trapezius.*
3. *Rhomboides.*
4. *Levator Scapulæ.*
5. *Serratus Major.*

1. SERRATUS MINOR ANTICUS, lies immediately under the *Pectoralis*, and aſcends obliquely to the *Scapula*, as appears by the Direction of its Fibres. Raiſe its inferior Side, then ſeparate from the Breaſt *χατα δαρσιν*, or with the ſubjacent Membrane, after having cut off its Origine from the Ribs. It adheres in its Progreſs to the *Deltoides*, under which it marches to the Caracoide Proceſs of the *Scapula*, where it is inſerted, from which ſeparate it.

While the Body lies ſupinely on the Table, you ſhould ſeparate the *Serratus anterior* and *Major* from the *Scapula* and *Muſculus Subſcapularis*,

pularis, then turn the Body, becauſe the other Muſcles of the *Scapula* lie on the Back.

2. TRAPEZIUS, alſo called *Cucullaris* or *Scapularis*, becauſe it covers the other Muſcles of the Neck and Back, and is the firſt that appears after the Body is laid on its Face, and the Skin and Fat are removed. It ariſes from the occipital Bone, from the Spines of the cervical and dorſal *Vertebræ*, and the fleſhy Fibres run in different Directions, and terminate by one continued inſertion into the Spine of the *Scapula*. To raiſe this Muſcle, begin at the inferior Part oppoſite to the Loins, where the Fibres aſcend obliquely toward the *Scapula*; cut off theſe Fibres, after puſhing back the *Scapula* to the Back, and, putting your Finger under the Muſcle, ſeparate it till you come to the *Aponeuroſis*, which unites it with the Spines: This *Aponeuroſis* muſt be ſeparated from the *Sacro-Lumbaris* and the *Longiſſimus Dorſi*, and cut off from the Spines, aſcending gradually to the Head; when you are above the Muſcles of the Neck, return to the *Scapula*, and ſeparate the *Trapezius* from its ſpinal Proceſs, that it may not hereafter be in your Way.

3. RHOMBOIDES, called alſo *Quadratus* from its Figure, lies under the *Trapezius*;

ariſes from the ſuperior *Vertebræ* of the Back, and inferior of the Neck, and reaching obliquely down to the Baſis of the *Scapula*, is there inſerted. You are, according to the Directions given with reſpect to the former Muſcle, to ſeparate this, by the Help of your Hand, from the ſubjacent Parts, beginning at the Side: But, becauſe it cloſely adheres in its Courſe to the Tendon of the *Serratus Poſticus Superior*, you are there to uſe the Knife, and cut it off at its Origine and Inſertion.

4. LEVATOR, called alſo *Muſculus Patientiæ*, becauſe it is generally uſed in pulling up the Shoulder, when we expreſs any Sign of Paſſion. The Origine of this Muſcle lies hid among the Muſcles of the Neck; therefore ſeparate the *Maſtoidæus* and *Scalenus* from the anterior Side, in order to find it, which is in the tranſverſe Proceſſes of the ſuperior *Vertebræ* of the Neck; cut it off from thence, and trace its Inſertion, which is in the ſuperior Angle of the *Scapula*.

5. SERRATUS MAJOR, ariſes internally from the whole Baſis of the *Scapula*, and is inſerted by Dentiform, or Tooth-like Proceſſes,

by an equal Number of them, from whence it has taken its Name, into all the true Ribs, and ſome of the falſe. Separate this Muſcle anteriorly from the *Subſcapularis*, of which hereafter; poſteriorly from the Ribs, which may be wholly done χατα δαρσιν, or by raiſing only the ſubjacent Membrane, except its Origine and Inſertion, which muſt be cut off with a Knife.

CHAP. III.

Of the MUSCLES *of the* HUMERUS.

THE Muſcles deſtined to move the *Humerus*, are generally reckoned nine, *viz.*

1. *Pectoralis Major.*
2. *Deltoides.*
3. *Perforatus.*
4. *Latiſſimus Dorſi.*
5. *Rotundus Major.*
6. *Rotundus Minor.*
7. *Infraſpinatus.*
8. *Supraſpinatus.*
9. *Subſcapularis.*

1. PECTORALIS MAJOR lies upon, and covers the greateſt Part of the Breaſt. The

Method of raiſing this Muſcle I have already ſhewn in Book II. Chap. II. If you remove the *Pectoralis* and *Serratus Minor*, you will ſee three Kinds of Veſſels coming out of the *Thorax* through the *Muſculus Scalenus.* From the ſuperior Nerve, (for here five thick Nerves unite) ariſes a Branch, which reflecting backward, is diſtributed among the Muſcles of the *Scapula.* From the ſame Place ariſe the Cephalic and Hepatic Veins; the firſt of which, paſſing between the *Deltoides* and *Pectoralis*, makes its Appearance at the Extremities of theſe Muſcles, and, continuing its Courſe under the Skin along the external Side of the *Biceps*, where it is accompanied by a Nerve, goes deeper at the Flexure of the *Cubitus.* The Hepatic Vein paſſes along the Inſide of the Arm, and after forming the Median Vein, deſcends to the Head. I now return to the Muſcles.

2. DELTOIDES is a large broad Muſcle, which lies upon the ſuperior Part of the Arm, and may be felt in living People. It ariſes from the Spine of the *Scapula*, the *Acromion* and *Clavicula*, and is inſerted in a rough Protuberance near the Middle of the *Humerus*, almoſt at the ſame Place with the

Pectoralis Major. Separate firſt the Cephalic Vein; then, raiſing the *Humerus*, diſſect the *Deltoides*, firſt in the Side next the Back, becauſe it adheres but looſely in that Place, therefore more eaſily ſeparated. It aſcends above the *Infraſpinatus* to the Spine of the *Scapula*, to which you are to keep in making your Inciſion, carrying it obliquely upwards, and when you come to the Spine, there cut it off; then ſeparate it from the *Acromion* and *Clavicula*, and turning it toward the *Humerus*, ſeparate it, at its Inſertion, from that Bone, which is there very firm.

3. PERFORATUS is a ſlender Muſcle perforated in the Middle, for letting a large Branch of the fourth Pair of Nerves of the Neck to paſs through it for forming the firſt brachial Pair; hence it has its Name from *Veſlingius*, but *Riolan* calls it *Coracoidæus*, and *Coraco-brachialis*, from its Origine and Inſertion. It adheres to the *Scapula*, with one of the Heads of the *Biceps*, with which it is cloſely joined and intermixed. Begin and ſeparate this Muſcle near its Inſertion from the *Biceps*. You will here obſerve that Nerve, which being ſeparated from that Conjugation of Nerves that go to the Arm, perfo-

rates the Inſide of this Muſcle, and continues its Courſe under the *Biceps* to the *Cubitus* and Extremity of the Hand.

On the Inſide of this Muſcle lies a large Nerve with Veins and Arteries; about the Middle of the *Perforatus* one of the Branches leaving its Trunk, and, under the *Extenſor Biceps Cubiti*, accompanying the *Brachiæus Internus*, is diſtributed among the Muſcles, ſituate at the poſterior Part of the *Cubitus*, yet ſo, that a Part thereof marches along the *Supinator Longus* to the Hand, climbs over the *Radius*, and diſtributes its Branches upon the external Side of the Index and Middle-finger. Near the End of this Muſcle the Nerve is divided into two Parts; one is carried back towards the *Cubitus*, from thence to the Extremity of the Little-finger; hence the Cauſe of Pain or Numeneſs in the Little-finger when the *Olecranon* is hurt; the other portion proceeding forward between the *Profundus* and *Sublimis* to the Hand, enters it under the Thumb, and from thence goes to the Extremities of the Fore and Middle-fingers.

You are now to turn the Body, becauſe

all the abovementioned Muſcles are ſituate in its anterior Part.

4. LATISSIMUS DORSI, called alſo *Aniſcalptor*, ariſes by a broad *Aponeuroſis* from the Spines of the *Lumbus Vertebræ*, and from the Spine of the *Os Ilium*.

In raiſing the abdominal Muſcles, I adviſed you to ſeparate a Part of this Muſcle; therefore begin your Section here, carry it upward, and ſeparate the Muſcle with your Fingers, or the Handle of the Knife, which will eaſily and quickly break the Fibres; then deſcending towards its Origine, cut off from the Spine the *Os Ilium*, and carefully ſeparate it from the *Serratus Poſticus Inferior*, becauſe here their tendinous Origines are not only cloſely united, but ſo intermixed with each other, that it will require a careful Hand to remove this Muſcle, and keep the *Serratus* on the Body. In ſeparating this Muſcle, you will meet with a ſmall Bundle of fleſhy Fibres, ariſing from the external Side of the Baſe of the *Scapula*, near its anterior Angle, and adhering to the ſuperior Part of this Muſcle in its Progreſs along the *Coſta inferior*, to be loſt in the ſame, where it began to grow tendinous. If theſe fleſhy

Fibres are not to be reckoned a diſtinct Muſcle, which none has yet done, they muſt then of courſe be taken for a Part of this Muſcle, becauſe they unite, and are inſerted with it. Which of theſe ſoever be the Caſe, you are to raiſe them from the *Scapula*, and ſeparate them with the *Latiſſimus Dorſi.*

If the Clavicle is ſeparated, you may take off the Arm from the Body, in order to manage it better hereafter according to Pleaſure.

5. ROTUNDUS MAJOR, called alſo *Teres Major*, lies contiguous to the abovementionèd carnous Maſs, and takes its Origine from the inferior Angle of the *Scapula.* Near to this is the

6. ROTUNDUS MINOR, or the *Tranſverſalis Brevis*, which ariſes from the inferior *Coſta* of the *Scapula*, but ſomewhat nearer to the Arm. Separate theſe two Muſcles, by beginning at their Inſertions where they are diſtinct; for the firſt has its Inſertion near the Middle of the *Humerus*, and the other in its Head. Having ſeparated them, cut off the *Rotundus Major* from the *Coſta Scapulæ*, and the *Minor* from the *Infraſpinatus*, and likewiſe at its Origine.

7. INFRASPINATUS, called alſo *Superſcapularis Inferior* and *Secundus*, lies hid in that Cavity of the *Scapula*, formed by the Spine and the *Dorſum Scapulæ* in its inferior Part, and is inſerted in the rough Protuberance on the Head at the *Humerus*. The whole Operation of this Muſcle is performed by beginning with raiſing it from the Bone, and ending with cutting it off at its Inſertion.

8. SUPRASPINATUS, termed alſo *Superſcapularis Superior* and *Primus*, is ſituate in the ſuperior Cavity of the *Scapula*, oppoſite to the former, or in the *Interſcapulum Superius*, and proceeds under the *Acromion* to the Head of the *Humerus*. Firſt, cut off the Ligaments between the two Proceſſes of the *Scapula*, and then raiſe the Muſcle from the Bone, beginning at the Spine of the *Scapula*.

9. SUBSCAPULARIS, denominated alſo *Infraſcapularis* and *Immerſus*, poſſeſſes the inner or concave Side of the *Scapula*, ariſes from its Baſe, and is inſerted in the Protuberance on the Head of the *Humerus*. Raiſe it firſt from the *Coſta Scapulæ*, and then from its Cavity.

CHAP. IV.

Of the MUSCLES *that move the* CUBITUS.

THE *Cubitus* has five Muſcles for performing its double Motion, *viz.* Flexion and Extenſion, two Flexors ſituate on the Fore-ſide of the Arm, and three Extenſors on the Back-ſide. As to the Flexors, it muſt be obſerved, that their Connection with the *Cubitus* can ſcarce be ſeen, till ſome Muſcles belonging to the Hand are removed, of which more in the next Chapter; therefore you muſt not be too quick in cutting off theſe Muſcles, but leave the Diſſection of their Origine till you are done with the Muſcles of the Hand.

The Diſpoſition and Names of theſe Muſcles are as follow, *viz.*

1. *Biceps.*
2. *Brachiæus Internus.*
3. *Extenſor Longus.*
4. *Extenſor Brevis.*
5. *Anconæus.*

1. **BICEPS** is the firſt of the Flexors, and ſo called from its double Origine; one whereof ariſes from the *Proceſſus Coracoides*, and the other from the inferior Part of the *Cervix Scapulæ*. It deſcends ſtreight down, and is inſerted in the Tubercle of the *Radius* by a ſtrong thick Tendon; hence the Reaſon that we feel a Stiffneſs near the Flexure, by ſtrongly drawing back the *Cubitus* on a ſudden. The Median Vein paſſes along this Muſcle, therefore you muſt take Care not to prick the ſubjacent Tendon when the Vein is opened. The Separation of this Muſcle is eaſily performed, if you take hold of its two Heads in your Hand, and pull them down, then ſeparate it κατα δαρσιν, or with the ſubjacent Membrane. You may pull aſunder its fleſhy Bellies, or ſeparate them with the Knife; for each of them, near its Origine, is wrapt up in a particular Membrane.

2. **BRACHIÆUS INTERNUS** is the ſecond of the Flexors, which ariſes from about the Middle of the *Humerus*, from whence it deſcends under the former Muſcle upon the *Humerus*, hence its Name; and is inſerted into the ſuperior and anterior Ecphyſis of the *Ulna*. It is hid among the Muſcles of the

Radius, and adheres chiefly to the *Supinator Longus*, which muſt be firſt raiſed before you can go about the Diſſection of this Muſcle, which may there be ſeparated from the *Humerus*, and afterward pulled down. The Veins and Arteries which go to the Inſide of the Hand, and eſpecially the *Carpus*, paſs over this Muſcle in their Way. Having done with the Flexors, we now come to the Extenſors.

3. EXTENSOR LONGUS, which may alſo be called *Biceps Poſticus*, becauſe it has a double Origine; one of which ariſes from the inferior *Coſta Scapulæ*, near its *Cervix*, and the other from the *Humerus*; both which unite, and are inſerted into the ſuperior and external Proceſs of the *Ulna*, termed *Ancon*, or *Olecranon* *. To this Muſcle is joined a Nerve that deſcends to the *Carpus*, of which already in the firſt Chapter, under the *Perforatus*. This Muſcle is eaſily ſeparated at its Origine; but it is a very difficult Operation at its Inſertion, where it cloſely adheres to, and, in ſome Meaſure, intermixed with

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* *Riolan* makes two Muſcles of this, and calls that the *Exterior Longus* which ariſes from the *Coſta Scapulæ*, and the other the *Brevis*, which takes its Origine from the Neck of the *Humerus*.

the *Extenſor Brevis*; for it muſt be here carefully obſerved, that the Endings of *Extenſor Longus* and *Brevis* unite as it were into one, before they are inſerted into the *Olecranon*, juſt as thoſe which are ſubſervient to the Extenſion of the *Tibia*; the *Vaſti*, *Crureus*, and *Rectus*, being cloſely intermixed with one another, make but one Tendon, which, ſurrounding the *Patella*, is inſerted into the anterior Part of the *Tibia*.

4. EXTENSOR BREVIS, called by *Riolan Brachiæus Externus*, ariſes poſteriorly from about the Neck of the *Humerus*, to which it adheres in its Deſcent to the external Condyle of that Bone. It muſt, in ſome Meaſure, be diſtinguiſhed from the former Muſcles, and ſcraped off from the *Humerus*.

5. ANCONÆUS, being a very ſmall Muſcle, about the Bigneſs of one's Thumb, is ſituate on the external Side, on the *Olecranon* above the Articulation. It may be ſeen through the nervous Coat in which it is wrapt, and is diſtinguiſhed from the reſt of the Muſcles by a white Line. Make an Inciſion in the Membrane above the white Line, which goes obliquely to the *Cubitus*, then ſeparate this Muſcle from the adjacent ones, from the

inferior Ecphyſis of the *Humerus*, alſo from the *Olecranon* and *Cubitus*.

I would have added the Muſcle of the *Radius* to thoſe of the *Cubitus*; but theſe being placed very deep among thoſe of the *Cubitus*, is the Reaſon why I have reſerved them to the next Chapter.

CHAP. V.

Of the Muſcles which lie upon the CUBITUS *and* RADIUS.

IT is proper to advertiſe the Reader, that I do not intend to follow the common Method of Anatomiſts, which is to examine firſt the Flexors and Extenſors of the *Carpus*, then the Flexors and Extenſors of the Fingers, but to purſue that Method which Nature has made uſe of in the Diſpoſition of theſe Muſcles; that is, to begin at ſome proper Place, and from thence go through with the Muſcles in the Order they lie, till you return to the ſame Place from whence you ſet out: For the *Cubitus* and *Radius* are every ry where ſurrounded and incloſed with Muſcles, which muſt be ſeparated in the ſame Order I ſhall direct you, beginning at the external Side of the *Cubitus.*

I would have this general Rule obſerved concerning thoſe Muſcles which have long Tendons, *to begin their Separation at the Tendon*, which is the eaſieſt and beſt Method. *Galen* is of the ſame Opinion, as is plain from what he ſays of the Flexors of the *Carpus. Begin the Diſſection of theſe Muſcles, which ſerve to bend the Wriſt a little above the Flexure of the Joint, becauſe there they terminate in thin nervous Bodies, and diſcover the circumſcribed Extremities of their Tendons ariſing from thence; then you are to ſeparate them from their ſubjacent and ſurrounding Parts as far as their Extremities, as has been already ſhewn.* But *Riolan* is of another Way of thinking, ſaying, *That we ſhould not begin the Diſſection of a Muſcle from its Tendon;* becauſe he imagines that a Muſcle may be divided into two or more by this Method of proceeding; but this is a trifling Objection, and may eaſily be removed, if the Anatomiſt is upon his Guard.

MEDICAL SOCIETY

The Diſpoſition and Names of the Muſcles we here intend to treat of are as follow, *viz.*

1. *Cubiteus Externus.*
2. *Extenſor Indicis proprius.*
3. *Extenſor minimi Digiti proprius.*
4. *Extenſores Pollicis.*
5. *Radiæus Externus.*
6. *Supinator Longus.*
7. *Supinator Brevis.*
8. *Pronator radii longus*
9. *Radiæus Internus.*
10. *Palmaris.*
11. *Sublimis.*
12. *Profundi.*
13. *Lumbricales.*
14. *Flexor Pollicis.*
15. *Cubiteus Internus.*
16. *Quadratus.*

1. CUBITEUS EXTERNUS, or *Extenſor Carpi Ulnaris*, ſo called becauſe it cloſely adheres to the poſterior Part of the *Cubitus*. It ariſes near the *Anconæus*, whoſe Separation I ſhewed you in the preceding Chapter, whence it is eaſily diſtinguiſhed, and is inſerted in the metacarpal Bone, under the little Finger. You may raiſe this Muſcle, as has been already mentioned, by clearing the Tendon of the ſubjacent Parts, and eſpecially of the Membrane, which covers moſt of the Tendons, and alſo inſinuates itſelf into the Muſcles, which it invelopes; therefore make a

longitudinal Inciſion in this Membrane in that Place where the white Line points between this Muſcle and the *Extenſor Digitorum*, and ſeparate the *Cubiteus* from the *Cubitus* and neighbouring Muſcle.

Before you proceed farther, cut that membranous, tendinous, and circular Ligament, which is ſituate near the *Carpus*, and keeps the Tendons of the Fingers in their Places. It is called *Armilla*, or the *Bracelet*, and is very viſible on the Back of the Hand, with its oblique tranſverſe Fibres. When it is cut, turn it aſide, that you may come at the Tendons.

Clear now the Tendons aſcending along the Back of the Hand towards the Fingers of their inveloping Membranes, put a Probe under the four largeſt ones, and raiſe them up, and cut the *Fibrillæ*, with the Point of the Knife, that unite them together, all the Way back to the *Cubitus*, where you will find the Difference between the *Extenſor Minimi Digiti*, *Indicis*, and *Carpi*. Having ſeparated it as far as its Origine, which is in the external Condyle of the *Humerus*, cut it off, and trace its Tendons to the Phalanges of the Fingers, in the Outſide of which you will find them firmly inſerted.

2. EXTENSOR INDICIS PROPRIUS, or *Indicator*, which imparts its Tendon not only to the Fore, but alſo to the Middle-finger, is to be ſeparated after the ſame Manner.

3. EXTENSOR MINIMI DIGITI PROPRIUS, which is a Kind of collateral auxiliary Muſcle to the *Extenſor Communis*, is alſo raiſed after the ſame Manner as the two former.

Theſe two Muſcles, united together, correſpond with the *Flexor Profundus*, as the former does with the *Flexor Sublimis*, therefore might properly enough be denominated *Extenſor Sublimis* and *Profundus*.

4. EXTENSORES POLLICIS, being three in Number, and having one and the ſame Origine about the Middle of the *Cubitus*, marching jointly along the *Radius*, and ſeparate only when they come near the Thumb, one of theſe Tendons being inſerted into the third Phalanx of the Thumb, and the other two into the ſecond and firſt Phalanges.

Theſe Muſcles are ſeparated as the former.

5. RADIALIS EXTERNUS, or the *Extenſor Carpi Primus*, lies along the external Angle of the *Radius*, hence its Name. It

ariſes from the external Condyle of the *Humerus*, and about the Middle of the *Radius* is divided into two Tendons, therefore called *Bicornis*, which are wrapt up in a Membrane, and inſerted into the *Carpus* and *Metacarpus*. *Galen* will have this to be a double Muſcle, becauſe it moves different Parts, and may be divided into two, if any one will give himſelf the Trouble. Therefore, in order to do this, make an Inciſion in the *Vagina*, and directing your Knife upward, divide theſe Muſcles, then you will ſee two diſtinct Muſcles, as *Riolan* alſo acknowledges in his *Enchiridion*. Betwixt this and the next following Muſcle, paſſes a Nerve along the Inſide to the Thumb and Fore-finger, likewiſe a Vein and Artery, whoſe Pulſation is felt in the *Carpus*.

6. SUPINATOR LONGUS, which ariſes above the external Apophyſis of the *Humerus*, and is inſerted into the inferior Extremity of the *Radius*.

7. SUPINATOR BREVIS lies under the former, has its Origine near the ſame Place with it, and, paſſing over the *Radius*, is inſerted into the Middle of it, in the Inſide. You may raiſe the *Supinator Longus* from the *Bre-*

vis with the Knife, beginning at the Sides, and continuing your Separation upward and downward. Having removed this Muſcle, you will ſoon ſee the *Supinator Brevis*, which immediately ſurrounds the *Radius*, and is wholly carnous both at its Origine and Inſertion. If you intend to ſeparate it, bend back the Hand, and ſcrape it off from the *Radius*, then cut it off at its Origine and Inſertion. Perhaps there will be no Occaſion for ſeparating it, becauſe, without touching it, the reſt of the Muſcles may be raiſed.

8. PRONATOR RADII LONGUS, whoſe Action is contrary to the former Muſcles, ariſes from the inner Condyle of the *Humerus*, and deſcending obliquely to the *Radius*, is inſerted in its poſterior Part. The Separation of this Muſcle is the ſame with that of the former Muſcles, which are furniſhed with long Tendons.

9. RADIALIS INTERNUS, or *Flexor Carpi Radialis*, being in an oppoſite Situation to that of the *Radialis Externus*, takes its Origine from the inner Condyle of the *Humerus*, near to that of the abovementioned Muſcle, and paſſing over the *Radius* to the Thumb, is inſerted into the firſt and

fourth metacarpal Bone. This is ſeparated as the former Muſcles.

10. PALMARIS ariſes from the inner Condyle of the *Humerus*, and has, near its Origine, a ſlender fleſhy Belly of a pyramidal Figure, but ſoon after degenerates into a long thin Tendon, which, deſcending ſtraight along the *Sublimis*, joins, in its Courſe, the metacarpal Bone, ſuſtaining the Thumb; it afterward diſappears, and is inſerted, by its nervous Fibres, into the firſt Condyle of the Fingers. Make an Inciſion in the Membrane above the Tendon which envelopes the Muſcles, and free the carnous Part of this Muſcle from thoſe which have the ſame Origine with it; then ſeparate it from the metacarpal Bone, and lifting up the broad Tendon, cut it off from the inner Tendons of the Hand.

After having raiſed this Muſcle, you will ſee a Nerve entring the Palm of the Hand under the Thumb, and diſtributing its Branches, *viz.* two to the Fore and Middle-Finger, and one to the Ring-finger. Under the Abductor of the Little-finger is another Nerve, which ſends two Branches to the Ring, and one to the Little-finger. If you intend to ſeparate them, follow their Courſe, and with a ſharp Knife make a longitudinal Inciſion into the membranous Coat which envelope them, then ſeparate them gently: They creep along the Sides of the Fingers to their Extremities.

11. SUBLIMIS, or *Perforatus*, which bends the ſecond Articulation of the Fingers, lies under the *Palmaris*, at its Origine, and in its Progreſs. This, at its Origine, ſeems to be only one Muſcle, but a little below the Middle of the Fore-arm is divided into four diſtinct Muſcles, that terminate into four long flat Tendons of different Sizes. Theſe Tendons being of a conſiderable Length, and having a long Way to go, wanted a Kind of Defence, that they might not, during their Courſe, be turned out of their Way; therefore Nature has taken Care to prevent this Inconvenience, by furniſhing them with a double Ligament; for in the *Carpus* they are braced down by the *Ligamentum annulare*; and in the Fingers, kept within their due Bounds by another circular Ligament; beſides which, they have Membranes that unite them together.

12. PROFUNDI, or *Perſorantes*, which bend the third Internode of the Fingers, are, in every Reſpect, like the former, except in this only, that they are not perforated, but perforate, thereſore called *Perſorantes*, and *Profundi*, becauſe they lie under the *Sublimis*. The Adminiſtration of theſe Muſcles being the ſame with that of the former, I will thereſore treat of them jointly. Make an Inciſion in that Ligament, which, ariſing at the Sides of the Fingers, ſurrounds the Tendons; but take Care not to cut the Tendons. Cut through the *Ligamentum annulare*, under which theſe tendinous Twigs paſs to the Fingers; put a Probe under the Tendons, and raiſe them all up; then deſire your Aſſiſtant to hold them up, while you ſeparate the Tendons, by cutting aſunder the Membranes. They are divided at firſt into four, but each are ſubdivided into two leſſer Tendons, which muſt be alſo ſeparated. You will eaſily diſtinguiſh the Interſtice with your Eyes, then cut through the Membrane that unites them together; lift up next, with a Probe, the Tendons of the *Perforatus*, and ſeparate the Muſcle towards its Origine, where you are to cut it off.

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off. Separate alſo the *Perforans* from the Ligament, which unites it with the Bones of the *Cubitus* and *Radius*, but take Care not to cut the Ligament in the Adminiſtration.

13. LUMBRICALES, which bend the firſt Joint of the Fingers, owe their Origine to the Tendons of the *Profundus*. *Riolan* ſays they ariſe from the annular Ligament, but I could never yet obſerve their Union with it; however, be that as it will, this not being a proper Place for diſputing the Matter, it is certain that they cloſely adhere to the Tendons of the *Profundus*, from whence they muſt be ſeparated; likewiſe from the *Interoſſei*, where you are to ſearch for their Inſertion, which is about the firſt Joint.

14. FLEXOR POLLICIS ariſes internally from the Middle of the *Cubitus*, and aſcends to the Thumb, under the *Thenar*, whoſe Buſineſs is to move the firſt Joint, and is ſometimes inſerted in the ſecond. The Adminiſtration of this Muſcle is the ſame with that of the former.

15. CUBITEUS INTERNUS, or *Flexor Carpi Alter*, ariſes laſtly from the inner Condyle of the *Humerus*, runs down along the

Ulna, and terminates, by a long Tendon, in the *Os Orbiculare* of the *Carpus*.

16. QUADRATUS, or *Alter Pronator Radii*, lying on the Inſide of the lower Extremity of the Fore-arm, makes its Appearance now after all the abovementioned Muſcles are removed. It is fixed by one Side or Edge to the *Cubitus*, and by the other to the *Radius*, owing its Origine to the firſt, and its Inſertion to the laſt. As there are no ſubjacent Muſcles, I ſee no great Occaſion for ſeparating it.

CHAP. VI.

Of the Muſcles which are placed in the HAND.

IN the Hand are found ſome ſmall Muſcles, the Adminiſtration of which ſhall be the Subject of this Chapter.

1. *Abductor minimi Digiti.*
2. *Thenar*, or *Abductor Pollicis.*
3. *Antithenar*, or *Adductor Pollicis.*
4. *Hypothenar*, or *Alter Adductor Pollicis.*
5. *Abductor Indicis.*
6. *Interoſſei.*

1. ABDUCTOR MINIMI DIGITI, being ſituate under the Little-finger, ariſes from the *Carpus*, but chiefly from two Bones, one of which is ſituate near the little Finger, the other under the Little and Ring-finger; and is inſerted in the firſt Internode of the Little-finger. To raiſe this Muſcle, begin at

the Back of the Hand, and ſeparate it from the metacarpal Bone, then cut it off at its Origine and Inſertion.

2. THENAR, or *Abductor Pollicis*, being ſituate on the Side of the Thumb, ariſes from that Bone which ſupports the Thumb, and is inſerted in the ſecond Joint of the Thumb. The Adminiſtration of this Muſcle is the ſame with the former.

3. ANTITHENAR, or *Adductor Pollicis*, being ſituate on the Back of the Hand, pulls the Thumb to the Fore-finger, and runs obliquely from the fourth metacarpal Bone to the firſt of the Thumb. Bring the Thumb gently to the Fore-finger, then ſeparate this Muſcle from the *Abductor Indicis*, which are eaſily diſtinguiſhed from each other by the different Poſition of their Fibres, and cut it off at its Origine from the metacarpal Bone.

4. HYPOTHENAR, or *Alter Adductor Pollicis*, being ſituate in the Palm of the Hand, pulls the Thumb to the Fingers, and takes its Origine from the ſecond metacarpal Bone. The Separation of this Muſcle is the ſame with that of the preceding; which

done, cut it off at the Thumb, or then you cannot ſo eaſily raiſe the

5. ABDUCTOR INDICIS, the Origine of which is cut off at the ſame Time with the Thumb; therefore you need only ſeparate this Muſcle from the metacarpal Bone.

6. INTEROSSEI are ſix in Number, *viz.* three internal, and three external; but theſe cannot be ſeparated till you divide the *Carpus* from the *Metacarpus*; therefore disjoin theſe two with a Knife, then cut through the Ligaments which unite the metacarpal Bones above and below; then you will, without any Direction, ſee the Difference between the internal and the external *Interoſſei.*

CHAP. VII.

Of the Muſcles that bend the HEAD.

THE Head, by its own Weight, being apt to incline forward, has therefore only one Pair of Muſcles; but to keep it erect, or ſupport it, is furniſhed with more, placed for that Intention in the Neck. That Pair ſituate in the anterior Part, is called MASTOIDEUS, which immediately appears upon ſeparating the muſcular Expanſion: Its Origine is cut off at the ſame Time you remove the *Sternum*, which you are to take hold of, and ſeparate it from the ſubjacent Muſcles, but eſpecially from the *Scalenus*; from thence you are to proceed to its Inſertion in the maſtoide Proceſs.

In the poſterior Part of the Neck are ſix Pair of Muſcles, generally aſcribed to the Head, *viz.*

1. *Splenius.*
2. *Complexus.*
3. *Rectus Major.*
4. *Rectus Minor.*
5. *Obliquus Superior.*
6. *Obliquus Inferior.*

1. SPLENIUS, which ſurrounds the poſterior Part of the Neck, immediatly appears upon removing the *Trapezius* and *Rhomboides*. It ariſes from the ſpinal *Opophyſis* of the cervical and dorſal *Vertebræ*, and is inſerted into the *Occiput*. Begin the Separation of this Muſcle on that Side next the *Alæ*, deſcending towards its Origine, which you are to cut off; then raiſe its Inſertion, but take Care you do not ſeparate the next following Muſcle.

2. COMPLEXUS lies immediately under the former, and is ſo called, becauſe it contains and comprehends as it were both the *Recti* and *Obliqui*. It has the ſame Origine and Inſertion with the former Pair; therefore the Separation is the ſame.

The *Complexus* are no ſooner removed, but the *Recti*, which are divided into *Majores* and *Minores*, and the *Obliqui*, into *Superiores* and *Inferiores*, immediately make their Appearance. Hence it is, that *Galen* juſtly wondered how *Lycus* could obſerve the *Recti* without taking Notice of the *Obliqui*.

3. RECTUS MAJOR ariſes from the Spine of the ſecond *Vertebra* of the Neck, aſcends obliquely to the *Occiput*, where it is inſerted, and covers in a Manner the

4. RECTUS MINOR, which differs only from the former in Origine, this ariſing from the firſt cervical *Vertebra*. If you intend to ſeparate *Rectus Major* and *Minor*, put your left Thumb upon the one, and Fore-finger upon the other, and thus pull them downward, then cut through the diſtended Fibres with the Point of the Knife, and ſeparate the *Rectus Major* either at its Origine or Inſertion.

5. OBLIQUUS SUPERIOR ariſes from the tranſverſe Proceſs of the *Atlas*, and terminates in the *Occiput*, near the *Rectus Major*. This is viſible enough without any Separation.

6. OBLIQUUS INFERIOR, is by ſome reckoned among the Muſcles belonging to the Head, but without any Reaſon, becauſe theſe Muſcles do not reach the *Cranium*; hence they ought not to be ranked among thoſe of the Head; by the ſame Rule, you may place the *Tranſverſalis Colli*, which has

the ſame Inſertion in the firſt *Vertebra* of the Neck, with the *Obliquus Major*; yet I will follow the common Method in placing them among thoſe belonging to the Head. They ariſe from the ſpinal Proceſs of the ſecond cervical *Vertebra*, from thence they aſcend obliquely to, and are inſerted in the tranſverſe Proceſs of the firſt *Vertebra*, where the *Obliqui Superiores* take their Origine.

Obſerve that theſe three Muſcles, *viz.* the *Recti Majores*, and the *Obliqui Superiores* and *Inferiores*, taken jointly, form a Triangle, whereof the *Obliquus Inferior* is the Baſe, and the reſt form the Sides; therefore they are eaſily diſtinguiſhed from each other, eſpecially ſince the *Rectus* makes that Side of the Triangle which is next the Spine.

CHAP. VIII.

Of the Muſcles of the NECK.

THE Neck has four Pair of Muſcles, the firſt two Pair ſituate anteriorly lower for bending it, and the laſt two Pair placed poſteriorly for extending it.

1. *Scalenus.*	3. *Spinalis.*
2. *Longus.*	4. *Tranſverſalis.*

The two firſt Pair muſt be raiſed while the Subject lies upon its Back.

1. SCALENUS, ariſing from the firſt Rib, and terminating in the tranſverſe Proceſſes of the cervical *Vertebræ*, becomes conſpicuous as ſoon as you have diſſected the abovementioned Muſcles; and the Method of raiſing this Muſcle is plain of itſelf. But if you deſign to diſſect this Muſcle while the other Parts remain intire, ſeveral Things muſt be obſerved. The chief Particular to be taken notice of, is the Paſſage of the axillary Veſſels through this Muſcle to the Arm; therefore

fore you muſt take Care not to hurt them, otherwiſe you muſt expect to meet with an Effuſion of Blood. Firſt raiſe the *Maſtoideus*, of which already, then the *Levator Scapulæ*, ſituate laterally on the Outſide, and ariſing in the ſame Place where this is inſerted; afterward ſeparate the *Scalenus* from the Rib, and cut it off at its Origine.

2. LONGUS, ſituate laterally along the Fore-ſide of all the cervical *Vertebræ*, and ſome of the ſuperior dorſal *Vertebræ*, ariſes generally from the fifth *Vertebra* of the Back, but Nature varies here; becauſe it ſometimes ariſes from the fourth, and ſometimes from the third, and is inſerted in the Tubercle of the *Atlas*, or in the *Occiput*, as has been obſerved by *Columbus*. You are to ſeparate this Muſcle, by abrading it from the Sides of the *Vertebræ*.

Between the *Atlas* and the firſt dorſal *Vertebra*, you will ſee the cervical Veſſels paſſing through the *Perforatus* made in the tranſverſe Proceſſes of the cervical *Vertebræ*.

If you incline to have a full View of the two Extenſors of the Neck, the Body muſt be turned upon its Face; however, before you come at this, not only the Skin, but the *Trapezius*,

Trapezius, *Rhomboides*, *Serratus Poſticus Superior*, *Splenius*, and *Complexus*, muſt be removed, with a Part of the *Semi-ſpinalis*.

3. SPINALIS appears firſt in its natural Situation, after theſe Obſtacles are out of the Way, fixed to the ſuperior Spines of ſome of the cervical and dorſal *Vertebræ*.

4. TRANSVERSALIS, ſituate under the former, and filling up that Space between the tranſverſe and oblique Proceſſes, ariſes from the ſix ſuperior tranſverſe Proceſſes of the dorſal *Vertebræ*, and is inſerted into all thoſe of the Neck. Raiſe this Muſcle from the *Spinalis*, by making an Inciſion in that Line by which they are diſtinguiſhed, which is eaſily found if you ſeparate the *Spinalis Dorſi*, under which lies concealed the Origine of the *Tranſverſalis*, and then carry your Separation upward. Afterward ſeparate it from the tranſverſe Proceſſes, but do not cut off the tendinous Productions. If you raiſe the *Spinalis Colli* from the *Tranſverſalis*, it requires no farther Preparation.

CHAP. IX.

Of the Method of ſeparating the Skin and the Fat from the FOOT.

HE who underſtood and retained what was ſaid in the firſt Chapter of the firſt Book, will ſoon find that he is ſufficiently acquainted with the greateſt Part of this Operation; for this is ſo near a Kin to that of the former, that they will admit of very little, if any Difference; which though ſmall, yet muſt be explained here, leſt the Omiſſion thereof ſhould lead the young Anatomiſt into an Error.

Begin therefore your Inciſion of the Skin at the *Pubes*, and bring it down along the Inſide of the Thigh, Leg, and Foot, to the *Mola*; from thence turn a little toward the back Part, and end in the *Os Calcis*, behind the *Malleolus*. Make afterward another Inciſion, ſo as to form a right Angle with the former, diſſecting the Skin of the Foot to the Nail of the great Toe; this done, ſeparate the Skin after the ſame Manner as you did in the Hand; but the Adminiſtration is more difficult in the Leg and Back of the Foot, becauſe in thoſe Places there is generally a ſoft ſubjacent Fat. *Galen* did not ſo much as touch the Skin in the Bottom of the Foot, nor in the Palm of the Hand, on account of the tendinous Expanſion of the *Plantaris*; but there was no Occaſion for ſuch an over Care, becauſe the Skin may be eaſily ſeparated without hurting that Tendon.

You are likewiſe to obſerve, that there is in the Thigh a membranous Muſcle inveloping ſeveral other Muſcles, hence denominated *Faſcia Lata*. This Muſcle, though carnous at its Origine, yet ſoon degenerates into a broad Tendon, or rather a Membranous Expanſion, which you muſt take particular Care of, otherwiſe you may, by Miſtake, diſſect it for the *Panniculus Carnoſus*, which I have often ſeen done.

Therefore, to avoid falling into this Error, when you deſign to ſeparate the Fat, make an Inciſion at the Origine of this Muſcle, which is at the inferior Spine of the *Os Ilium*, but do not let the Knife go too deep, leſt you ſhould wound the membranous Expanſion of the Muſcle; and if you perceive the muſcular Fleſh denudated, you may reſt ſatisfied that your Inciſion is of a proper Depth.

Likewiſe when you ſeparate the Fat on the Bottom of the Foot, you are to begin on that Side of the great Toe next the other Toes, and take Care not to remove with the Fat that nervous Expanſion, which being ſtretched along the Sole of the Foot, and interwoven, as it were, with the Fat, is inſerted into the firſt Joints of the Toes. Round the *Os Calcis* lies a large Quantity of ſolid Fat, which muſt be removed, before you can have a full View of the Termination of the great Tendon.

CHAP. X.

Of the Muſcles of the THORAX *and* LOINS.

THE Muſcles of the *Thorax*, called by others the Muſcles of Reſpiration, are numerous, and of different Kinds: For it is ſaid, that theſe Muſcles, ſubſervient to Reſpiration, are the *Serratus Major*, of which already among the Muſcles of the *Scapula*, *Subclavii*, *Triangularis*, *Intercoſtalis*, *Diaphragm*, explained in the ſecond Book, *Serratus Poſticus Superior*, and the *Serratus Poſticus Inferior*, therefore we have only the two laſt to treat of.

SERRATUS POSTICUS SUPERIOR, lies under the *Rhomboides*, and ariſes by a broad *Aponeuroſis* from the three inferior *Vertebræ* of the Neck, and the firſt of the Back; from thence this *Aponeuroſis* paſſes over, and, in ſome Meaſure, covers the Muſcles of the Loins, whence ſome have taken it for a Ligament.

gament. But it is inſerted by carnous Digitations into three of the true Ribs, which it pulls upward. The Separation of this Muſcle depends wholly upon raiſing it at its Origine, which being done, you cannot miſs of finding its Inſertion.

SERRATUS POSTICUS INFERIOR lies under the *Latiſſimus Dorſi*, and is firmly united to its *Aponeuroſis*, which being ſeparated, it makes its Appearance. This Muſcle takes its Origine from the laſt *Vertebra* of the Back, and the firſt of the Loins, by a broad *Aponeuroſis* like the former Muſcle, and covers the Muſcles of the Loins; it is likewiſe inſerted by fleſhy Digitations into the four inferior Ribs, which pulls it upward. The Adminiſtration of this Muſcle is the ſame with that of the former.

We now come to the Muſcles of the Loins, which are,

1. *Sacro-Lumbaris.*
2. *Longiſſimus Dorſi.*
3. *Sacer.*
4. *Semi-ſpinalis.*
5. *Quadratus Lumborum.*

1. SACRO-LUMBARIS, having the uttermoſt Seat among thoſe Muſcles on the Ribs,

ariſes from the external Margin of the *Coſta Oſſis Ilium*; from thence it aſcends, and ſends its tendinous Portions and Digitations to all the Ribs. Separate this Muſcle from the *Longiſſimus Dorſi*, from which it is diſtinguiſhed by a yellowiſh Line, occaſioned by the intervening Fat; the Tract of which you are to follow in the Adminiſtration, and then you are ſure not to miſs. The Separation of this Muſcle at its Origine from the *Longiſſimus Dorſi* is attended with ſome Difficulty; becauſe the Origines of theſe Muſcles are ſo cloſely intermixed with the *Sacer*, that it is almoſt impoſſible to make an exact Diſtinction between them. It muſt be intirely raiſed from the Ribs, except the ſmall nervous Portions, which muſt be left. In the Loins you may ſeparate it from the ſubjacent *Quadratus* by a lateral Inciſion.

2. LONGISSIMUS DORSI, being contiguous to the *Sacer*, reaches along the Back to the Neck, and ſometimes as far as the *Occiput*; it is fixed to the Spines of the *Os Sacrum*, and to thoſe of the Loins, by a tendinous Expanſion. Make firſt an Inciſion in this *Aponeuroſis*, and ſeparate it from the ſubjacent *Sacer*, which will lead you to the

ſuperior Parts, and ſhew you where it is to be divided from the neighbouring Muſcles; then ſeparate the carnous Part from the Bones, to come at a Sight of the numerous *Faſciculi.*

3. SACER being next to this both in Origine and Progreſs, ariſes from the *Os Sacrum*; hence ſo called. It covers the tranſverſe Proceſſes of the Loins, and from thence reaches to ſome of the dorſal *Vertebræ* under the *Semi-ſpinalis.* It is ſcarce worth the while to ſeparate this Muſcle, becauſe there is nothing elſe under it but Bones.

SEMI-SPINALIS, whoſe Origine being placed under the Extremity of the former, ariſes from the ſpinal Proceſſes of the Loins, adheres to all the dorſal *Vertebræ,* and ſhuts itſelf up between the *Spinalis* and *Tranſverſalis.* If you have a Mind to ſeparate it, ſcrape it off with the Knife from the Bones. *Riolan* calls this Muſcle the *Spinalis,* and deduces its Origine from the Spines of the *Os Sacrum.*

5. QUADRATUS LUMBORUM, being intirely carnous, appears after removing the Origines of the *Longiſſimus Dorſi* and *Sacer*; it ariſes from the Spine of the *Os Ilium,*

um, and is inſerted into the inferior Rib and tranſverſe *Apophyſes* of the *Lumbar Vertebræ*. To raiſe this Muſcle, make an Inciſion at the Spine of the *Os Ilium*; and, having ſeparated it from the tranſverſe Proceſſes, cut it off from the inferior Rib.

CHAP. XI.

Of the Muſcles of the THIGH *and* LEG.

I Thought it abſolutely neceſſary to bring theſe two Parts into one Chapter, becauſe the Adminiſtration of the Muſcles of one, cannot be performed without the other, as will appear from what follows. The Muſcles we intend to treat of here are,

1. *Sartorius.*
2. *Membranoſus.*
3. *Rectus.*
4. *Vaſtus Externus.*
5. *Vaſtus Internus.*
6. *Crureus.*
7. *Gracilis.*
8. *Pſoas Magnus.*
9. *Pſoas Parvus.*
10. *Iliacus Internus.*
11. *Triceps.*
12. *Pectineus.*

13. *Glu-*

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13. *Glutæus Maximus.*
14. *Glutæus Medius.*
15. *Glutæus Minimus.*
16. *Iliacus Externus.*
17. *Obturator Internus.*
18. *Quadratus.*
19. *Biceps.*
20. *Seminervoſus.*
21. *Semimembranoſus.*
22. *Triceps.*
23. *Obturator Externus.*

1. SARTORIUS, or *Faſcialis*, or *Sutorius*, ariſes from the inferior Spine of the *Os Ilium*, and running obliquely over the Muſcles of the Thigh, is inſerted in the Inſide of the Head of the *Tibia*. This Muſcle may be eaſily ſeparated with the Hand, by putting your Finger between this and the *Rectus*, and parting them by moving your Finger upward and downward; then cut it off at its Origine and Inſertion.

2. MEMBRANOSUS, or *Faſcia Lata*, covers a great Part of the Thigh, eſpecially on the Outſide. I place its Inſertion in the *Tibia*; but *Riolan* will have it reach as far as the Foot. It ariſes from the Spine of the *Os Ilium*, near the *Sartorius*, where you are to begin your Inciſion, and ſeparate its carnous Part, which lies concealed among the other Muſcles; then ſeparate the nervous Membrane with the Knife, which cloſely adheres to that

Part where theſe two Muſcles meet; it likewiſe firmly adheres at the *Flexure*, under the Knee, and there ſeems to be inſerted. The Leg muſt be often turned in this Adminiſtration, becauſe this Membrane inveſts the Thigh behind and before.

Before you proceed farther, you will obſerve ſome Blood Veſſels paſs over the *Oſſa Innominata* along with the *Pſoas* and *Iliacus Internus*; from hence theſe Branches called the *Crurales* deſcend to the Foot, which, after got beyond the *Os Pubis*, ſend forth a long Branch, called the *Saphæna*, that runs down along the Inſide of the Thigh and Leg to the Foot; but the Trunk goes deeper between the *Vaſtus Internus* and *Crureus*, near the Tendon of the *Iliacus Internus*.

3. *Rectus*, ſo called on account of its ſtreight Situation in the Body; ariſes from the inferior Spine of the *Os Ilium*, from thence deſcends ſtreight down upon the *Crureus*, between the *Vaſtus Externus* and *Internus* to the Thigh. This Muſcle is eaſily ſeparated like the *Sartorius*, either with your Fingers, or the Handle of a Knife.

4. VASTUS EXTERNUS ariſes from the *Trochanter Major*, and from thence deſcends

along the Inſide of the Thigh to the *Tibia.* To raiſe this Muſcle, begin on the Inſide, and turn the Thigh, then ſeparate it from the *Biceps*, to which it cloſely adheres; afterward free it from the *Crureus* in that Place where theſe two Muſcles are united together by a white Line.

5. VASTUS INTERNUS is placed on the oppoſite Side, and takes its Origine from the *Trochanter Minor.* It is alſo diſtinguiſhed by a white Line from the *Crureus*, where you are to ſeparate it, then behind from *Gracilis* and *Triceps.*

6. CRUREUS lies immediately along the *Os Femoris*, from which it muſt be raiſed with the Knife. Theſe three Muſcles, along with the *Rectus*, unite into one Tendon, which ſurrounds the *Patella*, and fixes it to the Knee; therefore theſe three Muſcles being ſo nearly contiguous to one another, that they may be reckoned a *Triceps*, you may thus ſeparate them at one Operation. Separate the *Patella* on the Inſide, near the Flexure, from the *Tibia*, and continue your Separation, by aſcending gradually under the *Vaſtus Internus.* When you come to the *Os Femoris*, clear it of the Fleſh, and then re-

peat the ſame Operation on the oppoſite Side, under the *Vaſtus Externus.* Cut off the Heads of the *Vaſti*, and free the *Crureus* from the Bone, but take Care not to injure the Head of the *Biceps*, which lies on the Outſide. Having removed theſe Muſcles, you may ſeparate them into their proper Diviſions.

7. GRACILIS, ſo called from its being a thin Muſcle lying in a ſtreight Line along the Inſide of the Thigh, between the *Os Pubis* and Knee; it is likewiſe termed by *Riolan*, *Poſticus*, to diſtinguiſh it from the *Rectus.* It ariſes near the *Syntheſis* of the *Os Pubis*, and is inſerted into the Inſide of the Head of the *Tibia.* This Muſcle is eaſily ſeparated *κατα δαρσιν*, or with the ſubjacent Membrane. Having diſſected theſe Muſcles, return upward, and take a View of the *Pſoas* and *Iliacus Internus.*

8. PSOAS MAGNUS, is that round Muſcle which ariſes from the *Lumbar Vertebræ*, and running over the *Os Ilium*, is inſerted between the two *Trochanters.* Upon this you will often meet with another Muſcle, firſt diſcovered by *Riolan*, and called

9. PSOAS PARVUS, which muſt be raiſed. It ariſes by a ſhort Tendon from the firſt *Lumbar Vertebra*, from thence it runs down, but ſoon after degenerates into a long thin broad Tendon, which is inſerted into the *Criſta* of the *Os Pubis*. I have obſerved this Muſcle in a Monkey to be of the ſame Magnitude with the *Pſoas Magnus*, which is of great Service for theſe Geſtures that Creature puts itſelf into. You may ſeparate the Tendon of this Muſcle, placed above the *Pſoas Magnus*, κατα δαρσιν with your Finger, then cut it off at its Origine and Inſertion; otherwiſe it will hinder you in raiſing the following Muſcles.

When you intend to ſeparate the *Pſoas Magnus*, begin and free it from the *Vertebræ*, then raiſe it laterally from the *Iliacus Internus*, deſcending gradually to the *Os Femoris*, till you come at its Inſertion. In the mean time neglect not obſerving that Nerve which ariſes from the *Medulla Spinalis*, between the third and fourth *Lumbar Vertebra*, paſſes over the *Sinus* of the *Os Ilium* along with this Muſcle, and is the Cauſe of that Numbneſs in the Thigh, Leg, and Foot, felt by thoſe who are afflicted with the Stone.

10. ILIACUS INTERNUS aſſiſts alſo in covering and filling up the Cavity of the *Ilium*, called by *Riolan* the Belly. It deſcends the ſame Way with the *Pſoas* above the *Iſchium* to the *Os Femoris*, and is inſerted at the Side of the *Trochanter Minor*. The Adminiſtration of this Muſcle is performed by making an Inciſion at the Margin of the *Os Ilium*, then freeing it from the Bone, which continue to its Inſertion. During this Operation, turn the Thigh a little inward. While the Body lies on its Back, there is another Muſcle to be examined, which goes by the Name of

11. TRICEPS, but *Riolan* will have it called *Quadriceps*, or *Quadrigeminus*, becauſe it has four Origines, and as many Inſertions; but he adds to this the *Lividus*, which others reckon a particular Muſcle; this he acknowledges, and ſays, that it ſeems to be a ſeparate Muſcle, and therefore gives it the Name of

12. PECTINEUS, which ariſes from the *Pecten*, or ſuperior Part of the *Os Pubis*, deſcends along the Inſide of the *Os Femoris* to the inferior *Epiphyſis*, where it is inſerted. If you reckon it a particular Muſcle, you

may diſſect it ſeparately from the *Triceps*, which is eaſily done, by making an Inciſion into that Membrane which unites them. But if you reckon it along with the *Triceps*, this Operation muſt be laid aſide till the poſterior Muſcles are raiſed.

But before you leave this Place, you ſhould take Notice of ſome remarkable Branches of Blood Veſſels, which paſs along the Union of the *Triceps* and *Pectineus* to the poſterior Parts, and being joined by a Nerve under the Flexure of the Knee, hide themſelves under the *Gaſterocnemii*. To come at a Sight of theſe Veſſels, turn the Leg obliquely outward.

Turn now the Body upon its Face, upon account of the Muſcles ſituate in the poſterior Parts, and the firſt Muſcle you are to begin with is the

13. GLUTÆUS MAXIMUS, which partly riſes from the *Os Ilium*, partly from the *Os Sacrum*, covers Part of the *Glutæus Medius*, and deſcends to that Space of the *Os Femoris* between both *Trochanters*. To finiſh the Adminiſtration of this Muſcle the ſooner, begin at the external Side, make a ſtreight Inciſion in its Membrane, which is very ſtrong, then

ſeparate it with your Finger as far as its Origine, which cut off, by beginning from the Spine of the *Os Ilium*, and proceeding to the *Os Sacrum*, and trace afterward its Inſertion, which is below the *Trochanter Major*, to which it is firmly joined, it muſt be therefore ſeparated with the Knife.

14. GLUTÆUS MEDIUS ariſes from the middle *Dorſum* of the *Os Ilium*, covers the *Glutæus Minimus*, and is inſerted into the *Trochanter Major*. The Adminiſtration of this Muſcle is almoſt the ſame with that of the preceding; but take Care you do not, at the ſame Time, ſeparate the *Pyriformis*, which firmly adheres to the poſterior Part of this Muſcle. A Vein coming from the interior Parts, and paſſing between theſe Muſcles, will point out to you the Interſtice.

15. GLUTÆUS MINIMUS is ſituate on the Outſide of the *Os Ilium*, under the two former, and paſſing over the Head of the *Os Femoris*, is inſerted into the upper Edge of the *Trochanter Major*. *Riolan* thinks this Muſcle needs not be ſeparated, becauſe nothing lies under it; but if you have a Mind to it, you may free it from the Bone with the

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Back of the Knife, and ſeparate its Adheſion from other Parts.

After theſe come the *Quadrigemini* and *Obturatores.* The firſt of the *Quadrigemini* is

16. ILIACUS EXTERNUS, or *Pyriformis,* which ariſes round and carnous from the poſterior Part of the *Os Sacrum,* but contracting ſoon after in Breadth, is inſerted by a ſtrong Tendon into the Cavity of the *Trochanter Major.* Separate the Sides of this Muſcle from the ſecond *Quadrigemini,* continue your Separation to its Origine, and there cut it off. Near this Muſcle you will ſee the thickeſt Nerve of the Body paſſing along the *Os Femoris,* and from thence to the *Tibia.* It marches in the Middle, between the *Biceps, Semimembranoſus,* and *Seminervoſus,* diſtributing its ſmall Branches to the adjacent Parts; but it divides into two Branches a little above the Knee, one of which deſcends along the Inſide of the Leg to the Foot, the other abſconds above the *Popliteus* under the *Gaſterocnemius* and *Soleus.*

The *ſecond* and *third Quadrigemini* are united at their Origine, Middle, and Inſertion, and only diſtinguiſhed from each other by a white Line, which being cut, the Tendon of the *Obturator Internus* makes its Appearance. Some Anatomiſts will not allow theſe to be reckoned proper Muſcles, but only a carnous *Involucrum* or Bag for the *Obturator Internus*, whence it has gone under the Name of *Burſalis* by ſome, and by others that of *Marſupialis*. You may diſſect theſe three Muſcles at once; but here you are to obſerve, that there is a *Foramen* in the *Os Coxæ*, to the internal *Labium* of which is fixed

17. OBTURATOR INTERNUS, which may be raiſed by introducing the Knife into the *Pelvis*, and freeing it from the Bone, over which it paſſes backward; continue ſeparating it in this Tract, till you come to the ſecond and third *Quadrigemini*, one whereof lies above, and the other below the *Obturator*, which they ſurround; remove them along with it, then you will come to their Inſertion, which is in the Cavity of the *Trochanter Major*. Having raiſed theſe Muſcles from the Bone, you may ſeparate them if you think proper, and divide this carnous Bag into two Parts.

18. QUADRATUS is the fourth of the *Quadrigemini*, and is ſituate near the ſecond and third. *Riolan* ſays, they are about two Inches diſtant from the former Muſcles, but

they ſeem to lie cloſs to one another when carefully viewed. Theſe being removed, you will ſoon ſee where you are to ſeparate the *Quadratus* from the ſubjacent *Obturator Externus.* Therefore begin your Adminiſtration on the upper Side, raiſe the *Quadratus* with a Hook, then introduce your Knife in the white Line, which is the Mark of Diſtinction between the one and the other, and free it from the ſubjacent Muſcle; afterward cut it off at its Origine. The Adminiſtration of the *Obturator Externus* muſt be let alone till the *Triceps* is removed.

In the poſterior Part of the *Femur* you will ſee the *Biceps*, *Seminervoſus*, and *Semimembranoſus.*

19. BICEPS, whoſe firſt, or longeſt Head, is fixed to the Tubercle of the *Os Iſchium*, and the ſecond, or ſhorteſt, to the *Os Femoris*, is placed near the following Muſcles. Separate the longeſt Head from the *Semimembranoſus* and the *Seminervoſus*, and cut it off from the Tubercle of the *Os Iſchium.* The ſhorter Head adhering firmly to the *Os Femoris*, muſt therefore be carefully raiſed from the Bone with the Back of the Knife; af-

terward cut off the Inſertion of this Muſcle from the *Tibia*.

20. SEMINERVOSUS,
21. SEMIMEMBRANOSUS, } Are contiguous to the former Muſcle, they have the ſame Origine, Progreſs, and Inſertion, but differ in this, that the former is ſituate on the Outſide, and has a long ſlender Tendon towards its Inſertion; but this is placed on the Inſide, near the *Triceps*, and has a broad *Aponeuroſis* at its Origine. Separate theſe Muſcles from the *Triceps*, and from each other κατα δαρσιν, or with the ſubjacent Membranes.

22. TRICEPS, ſo called from having three Heads, and as many Inſertions. The three Heads ariſe from different Parts of the *Oſſa Pubis*; the firſt adheres to the ſuperior Angle, the ſecond to the Middle of the Bone, and the third to the inferior Part. Their Origines, as well as their Inſertions, are only at a ſmall Diſtance from one another; for that Inſertion, which is fixed to the inferior Part of the *Femur*, anſwers the firſt Head, the next to the ſecond, and the third to the third Head. According to theſe Marks the Parts of this Muſcle muſt be diſtinguiſhed;

ſtinguiſhed; for a more accurate Adminiſtration of them cannot be deſcribed.

23. OBTURATOR INTERNUS appears after the former Muſcle is removed; it is ſituate ſo deep under the *Quadratus*, that we could not attempt its Separation till now; when every Part beſides is removed this is left behind alone, and therefore it would be to no Purpoſe here to inſiſt upon its Separation.

CHAP. XII.

Of the Muſcles placed upon the TIBIA.

1. *GAſterocnemii.*
2. *Plantaris.*
3. *Soleus.*
4. *Popliteus.*
5. *Peronæus Biceps.*
6. *Extenſor Longus.*
7. *Peronæus Flexor.*
8. *Extenſor Pollicis.*
9. *Tibialis Anticus.*
10. *Flexor Digitorum Longus.*
11. *Tibialis Poſticus.*
12. *Flexor Pollicis.*

On the poſterior Part of the Leg are placed a great many Muſcles, as

1. GASTEROCNEMII, called by *Riolan*, *Gemelli*, ariſe by two flat Tendons from the two Condyles of the *Os Femoris*, and run down over the *Soleus* and *Plantaris*. Begin their Adminiſtration at the internal Side, make a longitudinal Inciſion in that ſtrong Membrane, which ſurrounds the whole Leg, then ſeparate it from the *Soleus* with your Finger, which will direct you to the Heads of the Muſcles that muſt be cut off. The fleſhy Bodies of theſe Muſcles are divided by a white Line into two Parts, which being diſſected, you may ſeparate them.

2. PLANTARIS, which anſwers to the *Palmaris* of the Hand, is placed under the former Muſcles; it ariſes carnous and ſlender from the outer Edge of the external Condyle of the *Os Femoris*, and ſoon after runs into a long flat Tendon, which deſcends along the external Side of the *Gaſterocnemii* to the *Os Calcis*, and is there inſerted into it with the Tendons of the *Soleus* and *Gaſterocnemii*. That nervous Body, which ſpreads itſelf along the Sole of the Foot, is reckoned a Part of this Muſcle; but I could never yet ſee

their Connection. Having made an Inciſion in the Membrane above the Tendon, proceed with your Operation upward till you come to the Origine of this Muſcle; then deſcend to the *Os Calcis*, and ſee whether you can find its Connection with the tendinous Expanſion.

3. SOLEUS having a pretty large fleſhy Belly, ariſes from the *Fibula*, then goes obliquely inward, and covers the Muſcle ſituate on the back Part of the *Tibia*, as it deſcends. It intermixes its Tendon with thoſe of the *Gaſterocnemii*, and forms what is called *Chorda Magna Tendo Achillis*, or *Nervus Ignavus*, by *Celſus*. This Muſcle may be ſeparated by beginning at its Tendon, and ſo aſcending to its Origine. It is inſerted into the poſterior Part of the *Os Calcis*, where you may cut it off, or let it alone.

4. POPLITEUS, or *Subpopliteus*, which is ſituate under the Ham, from whence it has its Name, appears after theſe Muſcles are removed. It ariſes from the external Side of the *Femur*, deſcends obliquely over the Head of the *Perone* to the Head of the *Tibia*, where it is ſometimes inſerted, and ſometimes it goes a little farther. If you intend

to raiſe this Muſcle, begin on that Side next the *Perone*, and ſo aſcending gradually upward from the Ligament which incloſes its Origine, ſeparate it to its Origine, which you may cut off. Return now to the Muſcles ſituate between the *Tibia* and *Fibula*; where I muſt inform you, that you are not to expect a full Account of the Method of ſeparating them; this I reckon unneceſſary, becauſe it is exactly the ſame with that preſcribed in diſſecting the Muſcles of the *Cubitus*. Therefore I will only ſhew you their Origine, Progreſs, and Inſertion, which being known, you will be able of yourſelf to accompliſh their Adminiſtration.

5. PERONÆUS BICEPS having a double Origine from the ſuperior and middle Part of the *Perone*, makes its Appearance at the ſuperior Part of the *Fibula* when denudated. Its ſuperior Head is fixed to the *Fibula* and *Cnemodactylius*, and its inferior Head approaches the Extenſor of the Great Toe. It runs down under the *Malleolus Externus*, paſſing through an annular Ligament to the *Metatarſus*, and is joined by one of its Tendons to the fifth metatarſal Bone: It paſſes by the other Tendon under the Sole of the

Foot, and ends under the great Toe. *Riolan* makes this a double Muſcle, and calls it the *Peronæus Externus* and *Internus.* It ſeems to anſwer the Functions of the *Bicoris* or *Radialis Externus* in the Hand, therefore might properly go under that Denomination here. You may ſeparate this Muſcle, by cutting the Ligament under the *Malleolus*, as you did the *Bicornis* in the Hand.

6. EXTENSOR LONGUS, or *Cnemodactylius*, ſituate near the former, ariſes from the Head of the *Tibia*, and deſcends along the Side of the *Tibialis Anticus* upon the Foot, and is inſerted into the four leſſer Toes. The Adminiſtration of this Muſcle is the ſame with that of the *Extenſor Longus* in the Hand.

To this is joined in its Progreſs, and, in ſome Meaſure, intermixed with its carnous Subſtance,

7. PERONÆUS FLEXOR, ſo called, but not deſcribed by *Riolan.* It ariſes from the Middle of the *Fibula*, and paſſing along with the Tendon of the *Extenſor Longus* through the annular Ligament, is inſerted between the fourth and fifth metatarſal Bone. It would

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be a difficult Taſk to contend how this Muſcle has been named by other Anatomiſts.

Betwixt this and the following Muſcle is placed

8. EXTENSOR POLLICIS, which deſcends from the Middle of the external Side of the *Tibia*, with the *Extenſor Longus*, to the Toes, particularly to the great Toe; but before it reaches ſo far, it is divided into two Tendons, which are inſerted into the firſt and ſecond Phalanges of the great Toe. The ſhorteſt of theſe two Tendons unite with the Tendon of the *Pediæus*.

9. TIBIALIS ANTICUS lies next to this and the *Tibia*, from which it takes its Origine, deſcends to the firſt Bone of the *Metacarpus*, into which it is inſerted, and ſends off a Branch to a Joint of the great Toe; hence it is that we can ſcarce bend the Foot without moving and extending, at the ſame Time, the great Toe.

Having removed this Muſcle, you then ſee the Ligament which units the *Tibia* and *Fibula*. On the oppoſite, or interior Side, behind, are placed the three following Muſcles.

10. FLEXOR DIGITORUM LONGUS, or *Perodactylius*, is the firſt which is to be raiſed. It ariſes from the inner and ſuperior Part of the *Fibula*, paſſes over, in its Deſcent, the *Tibialis Poſticus* near the Foot, and turns off by the *Malleolus Internus* to the *Maſſa Carnea*, with which it joins its Tendons.

11. TIBIALIS POSTICUS is the ſecond, which, like the *Anticus*, adheres uſually to the *Tibia*, it alſo paſſes under the *Malleolus* to the Cavity of the Foot, and firſt reaches the *Os Naviculare*, then the *Os Cubiforme*, with which it is joined.

12. FLEXOR POLLICIS is the third; it ariſes from the *Fibula*, paſſes under the *Malleolus Internus* to the great Toe, where its Tendon is alſo united with the *Oſſa Seſamoidea*. If theſe three Muſcles are to be diſſected, cut firſt the Ligament which unites their Tendons under the *Malleolus*, then ſeparate their Origines thus far; but do not proceed farther till you have raiſed the Muſcles placed upon the Foot, which I am now going to deſcribe.

CHAP. XIII.

Of the Muſcles placed upon the FOOT.

1. *Extenſor Brevis.*
2. *Interoſſei Externi*
3. *Flexor Brevis.*
4. *Maſſa Carnea.*
5. *Lumbricales.*
6. *Flexor Pollicis.*
7. *Abductor Minimi Digiti.*
8. *Abductor Pollicis.*
9. *Tranſverſalis.*
10. *Interoſſei Interni.*

1. EXTENSOR BREVIS, or *Pediæus*, which ariſes from the *Aſtragalus*, and ſends Tendons to all the Toes except the little one, is the firſt Muſcle that appears on the Back of the Foot. Separate this Muſcle firſt with the Point of the Knife from the Bones of the *Tarſus*, then from the *Aſtragalus*, and laſtly, its Tendons from the Bones of the *Metatarſus*, that you may ſee its Connection with the Toes.

2. INTEROSSEI EXTERNI are likewiſe ſituate on the Back-ſide of the Foot, which

muſt be ſeparated at the ſame Time with the *Interoſſei Interni*.

Under the Sole of the Foot are a great many Muſcles; therefore turn the Foot, and firſt ſeparate carefully the tendinous Expanſion of the *Plantaris* with the Fat, becauſe this Tendon adheres very cloſely to the *Flexor Brevis*, conſequently very hard to be ſeparated from it: However, do not let the Difficulty of this Operation deter you, but rather take Courage in Hopes of bringing your Anatomy, thus far carried on ſucceſsfully, to a happy Concluſion. Firſt ſeparate this Tendon from the firſt Phalanges of the Toes; you will then come at this Muſcle, by cutting gradually the carnous Fibres with the Point of the Knife from this extended Membrane, till you come to the *Os Calcis*.

3. FLEXOR BREVIS is next to be ſeparated from the *Abductor*, and cut off from the *Calcaneum*, that you may ſee the Tendons of thoſe Muſcles, which enter the Foot under it. Then ſeparate the ſame *Extenſor* from the *Abductor* of the Little-finger, and free it from the ſubjacent *Maſſa Carnea*, to find the Inſertions of the Tendons in the ſecond Phalanx of the Toes. I have ſometimes ob-

ſerved that it ſent Tendons only to three of the Toes, and paſſed by the little one, which I imagine is owing to the Coaleſcence of the ſecond and third Phalanges of the little Toe into one, which ſometimes happens, as is commonly obſerved in dead Bodies.

4. MASSA CARNEA is now to be ſeparated under the *Tarſus*, by beginning at that Side next the great Toe. You may obſerve, as you proceed, its firm Connection with the Tendons of the *Flexor Longus.*

5. LUMBRICALES, of which there are only three, becauſe the fourth Toe has no ſuch uſcle belonging to it, ſeem here to take their Riſe. You are to ſeparate the *Maſſa Carnea*, the Tendons of the *Flexor Longus* and the *Lumbricalis* together from the ſubjacent Fleſh, becauſe they are ſo firmly united as not to be divided till taken off. Obſerve that the Tendons of the *Flexor Longus* perforate the Tendons of the *Flexor Brevis*, as the *Sublimis* do the *Profundus* in the Hand.

6. FLEXOR POLLICIS may now be raiſed to the Place of its Inſertion.

7. ABDUCTOR MINIMI DIGITI, ſeems to be either a double, or a double-headed

Muſcle; for it has one Beginning from the fifth Bone of the *Metatarſus*, and another from the *Os Calcaneum*. This Muſcle muſt be ſeparated from the Bone in the ſame Manner as you did the like Muſcle in the Hand.

8. ABDUCTOR POLLICIS performs the ſame Functions, and is, in all Reſpects, like the *Abductor* of the Thumb.

In the Cavity of the Foot there is ſtill another *Maſſa Carnea*, which, adhering to the great Toe, is ſuppoſed to pull it to the other Toes. Under the Bones of the *Tarſus* lies a broad thin *Aponeuroſis*, which remove with the Knife, and then you will ſee the Origine of this *Maſſa Carnea*, by tracing which you will come to its Inſertion; but take Care you do not raiſe along with it the *Tranſverſalis* lying under the Roots of the Toes, and eaſily diſcovered by its tranſverſe Fibres. But to prevent ſuch a Miſtake, ſeparate firſt the

9. TRANSVERSALIS, and then the *Maſſa Carnea*.

10. INTEROSSEI INTERNI, being the laſt, are more protuberant than the *Externi*, and are ſeparated after the ſame Manner with thoſe under the ſame Name in the Hand, to the Deſcription of which I refer you.

We ſhould here obſerve laſtly, the Courſe of the Tendons of the *Tibialis Poſticus*, and the *Peronæus Poſticus* under the Sole of the Foot; for, what happens in no other Part of the Body, they decuſſate one another; one, entring the Foot under the great Toe, marches to the little Toe, while the other, being nearer to the Bones, enters the Foot under the little Toe, and runs to the great Toe.

BOOK V.

Of the Method of making a SKELETON.

The PREFACE.

WITHOUT a previous Knowledge of Oſteology, a Perſon, according to *Hippocrates*, *Galen*, and *Riolan*, muſt have but a very obſcure Idea of the Origine and Inſertion of the Muſcles, the Adheſion of the Parts, the immediate Integuments of the Bones, or of any other Branch in Anatomy.

A Man, with the greateſt Diligence, can never become a complete Anatomiſt, by merely converſing with Books; ocular Inſpection is therefore abſolutely neceſſary, in order to fix in his Mind the particular Figure and Shape of the human Bones: But, becauſe we cannot have always Acceſs to view freſh Bones, and are apt to forget Things if we have them not continually before us; to ſupply this Defect, we have contrived a Method of making Skeletons, or uniting dry human Bones almoſt in their proper Places, and preſerving them when thus articulated, that ſo, by often inſpecting them, we not only retain what was likely to eſcape our Memory, but rivet a deeper Impreſſion thereof. And this ſeems to be of as old a Date as any Operation in Phyſick; for *Galen*, ſay the Antients, uſed to prepare Bones, and unite them by proper Ligaments.

In our Age Arts have been ſo well improved that they are almoſt brought to Perfection; that of preparing Bones, and making Skeletons, has not been neglected, and ſuch Progreſs has been made therein, that my Maſter

D. *Si-*

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D. *Simon Paulli* has hit on a Method of making the Bones as white as the fineſt Ivory.

That the Art of building Skeletons, which is ſo neceſſary a Branch in Phyſick, may be well underſtood; I have, in Imitation of *Riolan*, who added to his Anatomy a conciſe *Oſſilegium*, annex'd a ſhort and eaſy Method to this practical Compendium of Anatomy.

I have already mentioned, if there is a Variety of Subjects to be had, that a proper Choice thereof ſhould be made in Anatomical Diſſections. The ſame ought to be obſerved as to the Bones, for thoſe are only fit for a Skeleton whoſe Fibres firmly cohere with each other; but *Columbus* is of a contrary Opinion, and thinks, that a young, ſhort Body, not luſty, is the fitteſt for this Purpoſe; however, I cannot help aſſuming the Boldneſs to tell him, that theſe Bones are leſs durable, and more liable to Corruption, than the Bones of an Adult. We indeed often ſee Infant Skeletons in Anatomical Theatres and the Repoſitories of Anatomiſts; but theſe ſerve more for Ornament than real Uſe, and are made up in a quite different Manner to adult Skeletons, which I have alſo ſubjoined to this by Way of Appendix.

Two different Operations are required in fitting up a Skeleton, *viz.* One for cleaning the Bones, and another for uniting them when cleaned, which are the chief Subject of this Book.

CHAP. I.

Of the Method of cleaning the BONES.

TO clean the Bones of their Impurities, requires ſeveral Operations. 1. The Bones muſt be ſeparated into proper Diviſions, becauſe you will not eaſily find a Copper large enough to receive the whole Body. 2. The Bones contain a medullary Oil, which muſt be extracted, otherwiſe it enters their Subſtance, ſpoils them of their Beauty, makes them appear of a yellowiſh Colour, and attracts a large Quantity of

Duſt, both externally and internally. 3. They muſt be ſteeped in Water to extract the Blood. 4. Boiled, to clear them of their Fleſh and Ligaments. And, 5. Cleaned. Each of which ſhall be fully explained in this Chapter.

The Separation and Diviſion of the BONES.

1. The Bones are to be ſeparated and divided into the Trunk and Extremities. Tie the Extremities, and put them into the Boiler, but they muſt be perforated to let out the Fat; therefore they muſt be firſt ſeparated from one another. Begin with the *Humerus*, and ſeparate it from the *Cervix Scapulæ*, by cutting the Ligaments that unite them. Afterwards ſeparate the *Humerus* from the *Cubitus* and *Radius*, by beginning at the *Radius*, and cutting the Ligament which articulates it with the *Humerus*, and ſurrounds its round Protuberance; then bend the *Humerus* and *Radius* Sidewiſe as if folded; by this Means the *Radius* will ſink into the Place where the former Section was made, and give Room for carrying the Section farther.

You may cut off the Hand after the ſame Manner. Find the external Part where the *Carpus* and *Radius* join, by bending the Hand once or twice; in that Place cut the Ligament croſs, by beginning with the Hand at the *Cubitus*, and bringing your Knife towards the Thumb; thus you will come at the interior Region of the *Carpus*, which you are there to cut, and take away the Hand. The *Cubitus* and *Radius* are ſeparated from each other, by bringing the Knife betwixt them, from one Extremity to the other.

The inferior Extremities, like the ſuperior, muſt be divided into three Parts. Bend the *Femur* backward and forward, and cut the Ligament ariſing from the Edge of the *Acetabulum*, and ſurrounding the Neck of the *Femur*, then cut the ſhort round Ligament, which takes its Origine from the Bottom of the *Acetabulum*, and is inſerted into the round Head of the *Femur*, and any other Part that hinders you from ſeparating this Bone.

Afterwards cut off the *Tibia*, by ſeparating the *Patella* from the *Femur*, then begin with either of the lateral Ligaments, next with the Middle, laſtly with the other lateral one and Membranes. There is an intervening Cartilage, which *Columbus* and *W. Fabricius* kept ſeparate; but it may be left with the *Tibia.*

To ſeparate the Foot, you are to extend it as far as poſſible, and cut the anterior Ligament at the Joint; then put the Knife under the external, and continue the Section till the Foot hang down on the oppoſite Side; what remains may be performed without any Inſtruction. The *Fibula* may be ſeparated from the *Tibia,* by making a longitudinal Inciſion in the Extremity, and a ſomewhat curvated one in the ſuperior, becauſe the *Fibula* is joined obliquely to the *Tibia* in the upper Part by *Synchondroſis.*

The Trunk is generally divided into five Parts, but three are ſufficient. The firſt is the Head, which (after having removed all the Muſcles) bend forward, and cut the Membrane reaching from it to the Neck, then incline the Head to either Side, and behind the Maſtoide Proceſſes ſearch for the Articulation, and cut it. The ſame Operation is to be performed on the other Side. You muſt take Care not to break or cut the Styloide Proceſſes. Some begin the Section, which is done with leſs Trouble, between the ſecond and third *Vertebræ*, or they put the *Vertebræ* of the Neck into the Copper by themſelves; I chuſe rather to leave them joined with the *Thorax*. Some ſeparate the Ribs from the *Vertebræ*, then tie them together, and afterwards put them into the Boiler; but this takes up too much Time, and is of no Service, becauſe they will ſeparate in boiling; beſides, their Extremities are liable to be broke.

The ſecond Part is the Neck and *Thorax*, which muſt be ſeparated from the *Lumbar Vertebræ*, by making an Inciſion through the Cartilage, joining the laſt *Vertebræ* of the *Thorax* with the firſt of the Loins, and the ſpinal Marrow. Next, invert the Body, and cut the Ligament which unites the Spines of both *Vertebræ*; afterwards extend and bend the Trunk to either Side, and carefully ſeparate the tranſverſe Proceſſes, becauſe they are, as it were, articulated to each other, and if violently disjointed, liable to be broke.

The ſuperior *Vertebræ* enters the *Sinus* of the inferior, and when the Muſcles of the Loins are removed, the Place where the Diſſection is to be made will eaſily ſhow itſelf.

II. *The Extraction of the* MEDULLARY SUBSTANCE.

2. When the Bones are ſeparated from each other, the Marrow is only to be extracted out of the large cylindrical ones, *viz.* the *Humerus*, *Radius*, and *Ulna*; the *Femur*, *Tibia*, and *Fibula*. To theſe ſome add the *Claviculæ*, the *Metacarpal*, and the *Metatarſal* Bones, with thoſe of the Fingers and Toes; out of which the Moderns extract no Marrow.

To perform this Operation, you muſt have two Sorts of Inſtruments, *viz.* Perforators and Pins.

The Perforators muſt be of different Sizes, for the greater and ſmaller Bones; the Shape of them may be ſeen in Figure 5. I have there only delineated the Inſtrument without the Handle, becauſe every one may have it made according to his Fancy; and it is no great Matter of what Form it is, provided it be fitted for the Hand of the Operator. The Pins ſhould be round, and made of Iron or Wood; if of Wood, they muſt be armed with Steel Points. Their Magnitude muſt be in Proportion to the Perforators, on account they paſs through the ſame Holes made by the Perforators. It will likewiſe be proper to uſe ſuch an Inſtrument as Gunſmiths have for cleaning Gun-barrels; but becauſe its Shape differs a little from theirs, I have given a Repreſentation of it in Figure 6.

Having furniſhed yourſelves with theſe Inſtruments, you are next to perforate the Bones; but the Ligaments muſt firſt be removed, becauſe the Point of the Perforator will be very much blunted, if ſuffered to paſs through them before it touches the Bones. You are alſo to perforate the Bone in ſuch a Place as is moſt convenient for extracting the Marrow, and preſerving the Beauty of the Skeleton; for the right performing of which, I offer the following Directions.

The *Vertex* of the Head of the *Humerus* muſt be ſo perforated, as that the Hole be in a ſtreight Line with the Cavity of the Bone. In the inferior Extremity it is to be perforated in the Hind-part, where there is a Kind of a ſuperficial Cavity for receiving the *Ancon*. The Hole is to be made after the

Perioſteum is removed; but this Perforation is attended with Difficulty.

The *Cubitus*, or *Olecranon*, is to be perforated in its ſuperior Part, and in the inferior Part about the Styloide Proceſs, where it ſinks a little, and from whence a Ligament takes its Origine, which muſt be removed before the Perforation is attempted. The *Radius* muſt be perforated in the Middle of its ſuperior and inferior *Epiphyſes*.

Before you ſet about to perforate the Head of the *Femur*, you muſt firſt clean the Cavity adjoining the *Trochanter Major*, wherein the Tendons of the *Quadrigemini* are inſerted, and then apply your Perforator. The lower Extremity of this Bone is to be perforated in the Middle of that *Sinus* between the Protuberances.

As for the *Tibia*, the round Ligament which connects it with the *Femur* muſt firſt be removed, and then you are to perforate it in that Place above, and directly oppoſite below.

The *Fibula* muſt be perforated above, in the Place where it joins the *Tibia*, and is ſmooth by the Cartilage covering it; and below, in that Cavity belonging to the *Malleolus*

leolus Externus, the Ligaments and Membranes being removed.

Having perforated the Bones, the Marrow is next to be extracted. To do which, take one of your Iron or Wooden Pins, and introduce it into either of the Holes of the Bone made by the Perforator, then puſh it backwards and forwards, till the Marrow is thruſt out at the oppoſite Hole. Lay aſide the Pin, and then take hold of a *Radula* of a Thickneſs in Proportion to the cylindrical Cavity of the Bone, preſs the Sides of it together with your Fingers, and introduce it into the Bone. This Inſtrument, when the Preſſure is removed, will ſcrape off the remaining Marrow from the Sides of the Bones, which is to be thruſt out by another Application of the Pin. You muſt likewiſe uſe internally a ſtrong crooked Iron Wire, to break the ſpongy and cellular Subſtance of the Bone, and thruſt it out with the Marrow.

The Marrow, after extracted, ſhould not be thrown away, but carefully put up in a Glaſs, and ſet in a warm Place to melt, till the Dregs ſubſide, and the clear Part afterward to be poured off.

Hilandus aſcribes many Uſes to this Marrow.

III. *The* BONES *are to be ſteeped in* WATER.

3. The Marrow being extracted, the Bones are next to be ſteeped in Water, to ſuck out the Blood, and draw off the adhering Fleſh; for if the Bones are boiled before they have lain ſome Time in Water, they will ever after be of a yellow, or an aſhy Colour. Hence I am apt to think, that if the Bones were laid in ſome particular Liquors, they might be brought to an Ivory Colour; but more of this hereafter.

Therefore lay the Bones about five or ſix Inches deep under Water for three or four Days, or till the Fleſh turns white, and the Water loſes its Tincture, and change it once or twice a Day. In Winter it is more difficult to extract the Blood than in Summer; the Bones therefore at ſuch a Time ſhould be kept in a warm Place, or ſteept in warm Water.

The

The boiling of the BONES.

4. We now come to treat of the Manner of boiling the Bones; but they muſt not all undergo that Operation, for the *Sternum*, will not ſuffer it, becauſe cartilaginous. Some are of Opinion, that the *Sternum* is only to be macerated in Water, and afterwards dried in the Sun. *Riolan* is againſt boiling the *Os Hyoides* and *Os Coccygis*, but upon what Account I know not; for the latter ſuffers no Detriment by boiling; and as to the former, it has no proper Place of Connection with the Skeleton, therefore ought not to be joined to it; yet this is no Reaſon that theſe Bones, if they are to be cleaned, ſhould not be ſomewhat boiled.

In boiling the Bones ſeveral Particulars are to be obſerved.

Riolan adviſes to put the Bones *firſt* into boiling Water; for by that Means he thinks the Operation will be ſooner over. And *Columbus* ſuppoſes, beſides other Advantages, that they will be much whiter than if they had been put in cold Water. 2. The Bones muſt be put a conſiderable Depth under

Water, becauſe they are often toſſed up and down by the boiling Water, and frequently ſwim on its Surface; therefore they ſhould be kept down with a Skimmer, or ſuch like Inſtrument, to prevent their Colour being ſpoiled with the Smoak. 3. The Bones of the Hands and Feet ſhould be ſeparately tied in a Piece of Cloth before thrown into the Kettle, otherwiſe their Articulations will be diſunited, on account the Ligaments ſeparate from the Bones in Time of boiling. 4. The Water is to be ſkimmed clean of its Naſtineſs, that the Bones may be white. 5. The Bones and Fleſh, while boiling, muſt be cleaned of their Fat, and due Care muſt be taken, that it do not return to the Bones; therefore it ſhould be taken off with a Skimmer. 6. As to the fixed Time of boiling we cannot determine, becauſe that depends intirely on the Nature of the Bones. Some think four or five Hours are enough; others reaſon more juſtly, and ſay, let them boil till the Fleſh falls off: Wherefore, if the Subject has been more than 21 Years old, after the Bones have boiled for four or five Hours, lay hold, with a Fleſh-hook, of one of the large Bones, and ſee whether it is fully boil-

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ed; if it is, you may go about cleaning them; if not, put it in again. As to the Time of boiling, it may be held a general Rule, that young Bones boil ſooner than adult ones. This even the common Cooks are appriſed of, becauſe they daily find that old Meat takes a longer Time in boiling than young. Young Bones, when too long boiled, grow exceeding tender, porous, and liable to break in Time of cleaning; This I am ſufficiently convinced of from Experience. The Feet and Hands muſt boil longeſt, that the Marrow (of which they contain a great Quantity) may have Time to evaporate through the Bones.

I mentioned that the *Sternum* ſhould be macerated in Water, and not boiled; when it has therefore lain in Water for three or four Days, it ſhould be taken out and cleaned, without any previous boiling.

Some, however, put it into boiling Water for a Minute or two, that the Membranes may be more eaſily extirpated; but *Veſalius* will not ſo much as ſuffer it to be ſprinkled with hot Water, and I think he is in the right; for it is of bad Conſequence to ſtrip the Cartilages of all their Membranes, becauſe they are then apt to ſplit, and when joined with Braſs Wire, greatly disfigure the Skeleton, nor can there be a greater Mark of Deformity in a Skeleton, though every other Way neatly connected, than a bad prepared *Os Pectoris*, with its Cartilages. Suppoſe the Cartilages are to be denudated, yet this may be done without boiling. Therefore I thus free only the *Os Pectoris* of its Membranes, and not the Cartilages; Having made a tranſverſe Section in the ſuperior Part of the *Sternum*, I cut all its Coats to the Bone, and ſcrape off as much of them from the Bone as I can take hold of with my Hand; this I ſo ſtretch as if I were to tear it aſunder, that the intervening Fibres cloſely adhering to the Bone may appear; which, partly by ſcraping, and partly by gently cutting, I clear the Bones of, till I come to the Cartilage *Xiphoides*, that, like other Cartilages, muſt be ſoftly treated. I afterwards repeat the ſame Operation on the oppoſite Side.

When the Bone is ſtripped of its Membranes, cut off the Cartilages covering the glenoide Cavity that receives the depreſſed Head of the Clavicle; afterwards clean the

Cartilages belonging to the Ribs of their Fleſh and Fat with the Knife.

This cannot be conveniently taught by Words; but it muſt ſerve for the preſent to advertiſe you to begin near the *Sternum*, and not to cut or break in the leaſt the Ligaments that unite the Cartilages and *Sternum*.

While the Cartilages are drying, they are apt to be contracted and diſtorted; therefore ſome proper Method muſt be fallen upon to make them keep their proper Diſtance and Situation.

We muſt get two Pins a little crooked, and fix one of them in the End of each Cartilage, and faſten them at ſuch a Diſtance as the Ends of the Cartilages uſe to be from one another in the Body; but becauſe their Diſtance will decreaſe by Degrees, after it has been ſpread a Day or two, you muſt extend it with a Cord, leſt it ſhould change its proper Situation. Hang up the *Sternum* to dry in a cold ſhady Place *.

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* *Veſalius* orders the *Sternum* to be laid in a moiſt Place, leſt the Cartilages ſhould be divided before they are connected with the Ribs; but if their Connection be too long deferred, it will be no Hindrance if the *Sternum* be dried; for when you are to join it, dip it in Water, and it will come to its natural Poſition; and when ſoftened, faſten it to the Ribs.

V. *Of cleaning the* BONES.

We now come to the cleaning of the Bones, upon which it would be trifling to ſpend many Words, ſince this Exerciſe diſcharges the Office of a Preceptor, and every one that can cut his Victuals, knows how to take the Fleſh off from a Bone; wherefore I will ſay no more upon this Subject, but only put you in Mind to be careful when you come to the *Epiphyſes*, becauſe their Subſtance is tender, and may be eaſily broke, if you apply a Knife to them with any conſiderable Force. You muſt alſo obſerve to wipe the Bones gently with a clean rough Towel; for ſhould you rub them roughly, eſpecially the *Vertebræ*, Ribs, *Os Sacrum*, or their Proceſſes, you may hurt them ſooner than you are aware of. But every Part which does not belong to the Subſtance of the Bones is to be taken away, as Fleſh, Membranes, Ligaments, and Cartilages*. We ſhould take particular Care in cleaning the *Claviculæ* and *Os Sacrnm*, becauſe they are very unequal; beſides, the *Os Sacrum* is crooked, contains the End of the ſpinal Marrow, and ſends out through its anterior and poſterior *Foramina* ſeveral Nerves. This Bone ſhould be cleaned on the Outſide, then the Nerves ſhould be thruſt back with an Iron Pin by their *Foramina* into the great Cavity, and afterward extracted with a Hook put in at that *Foramen* through which the ſpinal Marrow deſcends, or they may be puſhed downwards, and extracted at the lower *Foramen.*

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* Hence it happens that I do not underſtand *Riolan*, who, among theſe Parts which are demonſtrated after the Bones are well prepared, mentions, in the third Place, the cartilaginous Incruſtation of the Bones, and the Cover of the Membrane

To clean the Head is a very difficult Taſk, on account of its Baſis having ſeveral Protuberances and Proceſſes, which meeting together form a great many Cavities and *Foramina*, and theſe are filled with Fleſh and Mem-

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brane of the *Perioſteum*; for in preparing the Bones we remove the Cartilages, which, in Time of boiling, are torn and rent. It is impoſſible to preſerve the *Perioſteum*; for it ſeparates of itſelf from the largeſt Bones, therefore needs not be diſſected. I cannot well reliſh the Advice of *Columbus*, who deſires us to take Care, while the Bones are boiling, that no Injury be done to the Proceſſes and Cartilages covering their Extremities, and to ſee that none of the other moveable Cartilages be loſt. This Admonition, I think, is trifling; becauſe they ought to be viewed and demonſtrated before their Bones are committed to the Boiler, according to his own Way of thinking.

branes, which cloſely adhere to them: Their numerous *Foramina* increaſe the Difficulty, becauſe they paſs the *Cranium* ſometimes in a ſtreight, and ſometimes in an oblique Direction. To clean the Head therefore it requires a good Oſteologiſt, with a careful and experienced Hand; a particular Regard muſt likewiſe be had to the Styloide and Pterygoide Proceſſes, becauſe they are very ſlender: The Styloide are ſometimes joined to the Head by an intervening Cartilage, and therefore eaſily ſeparated; if you find them ſhake, cut them off, and lay them aſide, till you have an Opportnnity of re-uniting them. To clean theſe min ute Cavities, you muſt have a Pair of *Forceps* with long ſlender Points, for taking hold of and extracting the Membranes. This Inſtrument will ſerve to clean the *Meatus Auditorius*, and the other *Foramina* that will not admit of the Pin. As for ſuch as will receive the Pin, they may be cleaned with it, or with the Point of a Knife. While this is doing, endeavour to extract the *Oſſicula Auditus* out of the *Meatus Auditorius*, which you may hang at the mammillary Proceſs, or keep them ſome other Way. In cleaning the

Bones the following Directions are to be obſerved. There are many Bones ſo much like one another, that even the moſt experienced Anatomiſt is often at a Loſs to diſtinguiſh them, and yet every one muſt have its proper Place; therefore, to prevent loſing more Time ſearching for the Situation of the Bones than would be neceſſary in joining them, they muſt be tied with a Thread in their natural Order. For Inſtance, in the Hand beginning at the Little-finger, tie firſt its upper Joint, next the middle one, then the laſt; afterwards that metacarpal Bone which lies under it.

In the ſame Manner proceed with the Ring, Middle, and Fore-fingers, and with the Thumb. This Direction will ſerve for the other Hand, and alſo for the Feet.

The Ribs muſt alſo be tied in the ſame order they ſucceed one another; alſo the *Vertebræ*, eſpecially the dorſal ones, becauſe it is more difficult to diſtinguiſh them from one another than any of the reſt.

The Bones, when cleaned, are to be numbered, to ſee that none are loſt; Regard muſt likewiſe be had to the Teeth, which generally fall out of their Sockets while in the

Boiler, and alſo to their *Laminæ*, which are Parts of the temporal Bone, and adhere to the Sides of the *Synciput*, becauſe in boiling they often ſlide off *.

We have now ended the firſt Operation in the Structure of a Skeleton; however, ſome may object, and ſay, that we have taken no Notice of the Manner of poliſhing the Bones, which they think gives them an agreeable white Colour, that very much ſtrikes the Fancy of the Spectator; but this is more for Ornament than real Advantage, therefore I omit it, tho' I could ſay ſomething on that Subject: For Uſefulneſs, and not Beauty, which is not minded by Anatomiſts, is the chief Intention of this Book.

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* *Veſalius* adviſes when you have reckoned the Bones, to throw them again for a ſhort Time in boiling Water, then take them out, and rub them clean with a rough Towel; afterwards ſcrape off any Remainder of Ligaments, Membranes, Origines, or Inſertions of Muſcles. But this ſhould not be attempted in the ſlender Bones for Reaſons formerly mentioned.

CHAP. II.

Of the Method of articulating the BONES *when cleaned.*

A Skeleton is not only uſeful in bringing the young Oſteologiſt to the Knowledge of the Bones, but alſo to Anatomical Profeſſors, when they want to ſhew where the Muſcles have their Origines and Inſertions. It is on this Account that Bones, when joined in a particular Manner, are kept by Anatomiſts to be made uſe of on proper Occaſions; and therefore being obliged to have ſeveral Syſtems of Bones, I intend to ſhew how they may be ſo connected, that when the Skeleton is compleated, they may be divided into as many Parts as the Body will admit of, according to the Rules of *Oſteotomy*, and alſo to re-unite them in a few Minutes.

But before you ſet about the Work, ſome proper Inſtruments muſt be had, *viz.* Perforators,

forators or Piercers, the *Forceps*, a Pair of Sciſſars, and Thread.

I have delineated the common Perforators according to their Bigneſs, which are ſometimes called Needles, and ſometimes *Fibulæ*. Theſe ſhould be of a different Magnitude, in Proportion to the Bones they are to perforate. The Needle ſhould be ſhort and thick, to ſuſtain the Re-action of the ſmall Bones without breaking; and the Perforators long and thick, becauſe deſigned for perforating the large Bones.

You want another Machine to turn round the *Terebra*, and the moſt convenient one for that Intention is delineated in Figure 7. When you uſe this Machine, fix its Baſe in the Place you think moſt proper, only take Care that the Prominence of the turning Piece of Wood be expoſed to free Air, whereby you can, without Hindrance, apply the Bones to the *Terebra*, ſometimes in a ſtreight, and ſometimes in a curved Line. Having ſecured the Baſe, fix the *Terebra* in its own Place, and faſten it with a croſs Pin, then drawing the Bow backwards and forwards, you turn round the *Terebra*, to which apply the Bone to be perforated.

The Bones being perforated, you muſt have Wire for uniting them. *Fabricius* ſays the Antients uſed Fiddle-ſtrings, but theſe were of a ſhort Duration; he therefore ſubſtituted in their Room Braſs-wire, which laſts as long as the Bones. Iron-wire is of equal Strength with Braſs-wire, but is more liable to ruſt, therefore the latter is preferable to the former; but put it ſome Time in the Fire before you uſe it, to prevent its turning Brittle, and breaking when twiſted. While in the Fire it gathers Duſt, and loſes its Colour, yet, if ſcoured with Brick-duſt and Oil, you will free it of its Duſt, and recover its Colour *. Cut off with your Sciſſars or Pincers, a Piece of Wire of a certain Length, which put through the Holes of the Bone, and with a ſharp-pointed round *Forceps* pull it ſtrongly, and twiſt it ſo that it may not fall out, nor the Bones ſeparate from each other.

This is the general Method of connecting the Bones, and what has been ſaid concerning this Affair, might, perhaps, be ſufficient; but I intend to be more particular, and ſhew where the Bones ſhould be ſo perforated as to conceal from the Sight the Wire as much as poſſible, and likewiſe point out the Difference in joining particular Bones *.

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* Some would have the Wire boiled, to make it more flexible.

I begin with the Extremities, and firſt with the Hand, then the Foot, and laſtly the Trunk.

I. *Of articulating the Bones of the* UPPER EXTREMITIES.

In the Hand begin at the Extremities of the Fingers, and perforate twice the third Joint with a Needle on the Inſide near the Place of Articulation, or you may ſo perforate the Bone that both Holes may meet in one, which is agreeable to the Practice of many, who make only one Hole in a Bone; or as you begin with a double Perforation, you may end with one; which was *Fabricius*' Method, who twice perforated every Bone of the Fingers and *Metacarpus*, to hinder them from turning round *. But whether you make a ſingle or double Perforation, the ſuperior Hole muſt be in a ſtreight Line with the inferior: Therefore obſerve this general Rule; wherever the Perforation is made, that the Holes for receiving Wire muſt be parallel in the ſame Bone, and directly oppoſite to thoſe in the correſponding one. In order to this, place the Bones in the Situation they are afterwards to ſtand in; if the Bone is ſmall, mark the Place where you intend to begin the Perforation with a Needle; but if this cannot be done, take them gently up from one another, and fix your Eye on the Place where you deſign to fix the Perforator. This muſt be the general Method with all Bones of the Hands and Feet. If you make in every Bone two Holes, draw through both Ends of the Wire, and twiſt them under the *Metacarpus*; and if you deſign to make only one Hole in ſome Articulations of the Fingers of the Metacarpal and Metatarſal Bones, it muſt be done with the *Fibula*, becauſe the Wire muſt be drawn through the Hole after doubled and twiſted. You are likewiſe to perforate tranſverſly twice with the Needle the ſuperior Extremities of the Metacarpal Bones in the Prominence next the Palm of the Hand, and then, drawing through the Wire, unite them a little looſely, becauſe in live Subjects theſe Joints are not cloſely connected. If you will follow the Advice of ſome, you may eaſily join the Bones of the *Carpus* to thoſe of the *Metacarpus*; for in cleaning theſe Bones they leave the Ligaments intire, that the Operator may be eaſed of the Trouble of collecting the Bones again, and they uſe the ſame Method with thoſe of the Foot. It is indeed a troubleſome Affair to place every one of thoſe Bones in their natural Situation, and ſcarce practicable, except you have another Skeleton as a Pattern to go by, with reſpect to their Place and Situation. It is not poſſible here to direct you by verbal Inſtruction, becauſe thoſe Bones have no proper Names affixed to them. However, I will, in ſome Meaſure, endeavour to account for the Order in which they ſhould be joined, by giving them Names taken from their Figure.

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* *Fabricius* attempts ſomething of this Kind in a Letter to *Pavius*, annexed to a Treatiſe in *High Dutch* concerning the Excellency and Uſefulneſs of Anatomy, wherein are a great many uſeful Things, and ſeveral Defects, which I ſhall endeavour to ſupply.

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* This is indeed an excellent Way, but a very laborious and difficult one.

Under the Thumb lies the *Os Cubiforme*, which, on Account of the great Inequality of its Sides, ſhould rather be denominated *Os Trapezoides.* Under the Fore-finger is placed the *Trapezium.* Under the Middle-finger the *Os Magnum,* ſo called, becauſe it is the greateſt and thickeſt Bone in the *Carpus*, having a ſmall Prominence in the Hind-part. Under the Ring and Little-fingers is ſituate the *Os Unciforme,* ſo called from being crooked in the Inſide like a Hook. Next to this, on the Outſide, lies another ſmall Bone, whoſe Sides make three ſmall Triangles, and may be denominated *Os Cuneiforme*; to it is joined a ſmall Bone, about the Bigneſs of a Pea, concave on that Side which lies next the former. Theſe ſix Bones muſt be joined in the Order now mentioned, and each of them twice perforated with a Needle; then draw the Wire, as above directed, through the ſuperior Heads of the metacarpal Bones, but they muſt be placed a little oblique and crooked. Two Bones are yet remaining, one whereof I call Κοτυλοειδὲς, becauſe of its *Sinus*, which receives the ſmall Head of the *Os Magnum*; the other, *Os Lunatum*, becauſe it has a *Sinus* in Form of a Half-moon, which receives a Part of the ſame Protuberance of the *Os Magnum.* When you have found the proper Situation of theſe Bones, perforate them with the *Fibula* in thoſe Places correſponding to the metacarpal Bones, and pull the Wires already put through the Fingers, then join the Thumb according to the Directions given in articulating the Fingers *.

The *Cubitus* and *Radius* are connected above and below by the ſame Operation; only with this Difference, that ſuch Holes as are made in the ſuperior Part of the *Radius*, muſt be made in the inferior End of the *Cubitus*, and *vice verſa*. Therefore find out the natural Situation, then you will obſerve almoſt a third Part of the ſuperior Head of the *Radius* a little depreſſed; about the Edges of this Place fix your Needle, and make it paſs through the Hole made for taking out the Fat, but perforate the ſemilunar *Sinus* of the *Cubitus* at leaſt once with the *Fibula*. Twiſt now a double Wire, ſo as to form a ſmall Ring in its ſuperior Part like that in the Figure I intend to lay before you when I ſpeak of the

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* Some twiſt here the Wires, and join the Hand to the *Cubitus* and *Radius* with other Wires. But I think it more convenient to draw the Wires of the Thumb, Fore, and Middle-fingers through the *Radius*, and in this Place only twiſt the Wires belonging to the other Fingers.

Scapula; draw it through the Hole in the *Cubitus*, and faſten it, by twiſting it round; the Ring ſhould be turned towards the *Radius*. Then draw another Wire through either of the Holes of the *Radius*; after having drawn it through the Ring of the firſt Wire, put it through the other Hole of the *Radius*, and twiſt its two Extremities. After the ſame Manner you unite the inferior Parts of theſe Bones, if you underſtand the ſame of the *Radius* which I have ſaid of the *Cubitus*, and *vice verſa* of the *Cubitus* what has been mentioned of the *Radius*.

To join the *Cubitus* with the *Humerus*, perforate its two Protuberances; if you obſerve a little Riſing, which divides, as it were, this *Sinus* into two Parts, make the Holes parallel to this Eminence, and it is no great Matter if you touch its Surface; becauſe, when the Bones are joined, it cannot be ſeen. This Operation is ſomewhat difficult, on account the *Sinus* reſembles a Creſcent; therefore, according to the given Direction, the Bone ſhould be perforated in that Form which cannot be done, becauſe the *Terebra* muſt perforate the Bones in a ſtreight Line. To obviate this Difficulty, and that the Direction may

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may be ſomewhat crooked, puſh the *Terebra* from both Extremities of the Bone, ſo as that the *Foramina* meeting together may make an obtuſe Angle; then drive the *Terebra* into almoſt half the Thickneſs of the *Humerus*, a little above the *Trochlea*; afterwards draw a Wire through this and the former Holes, and twiſt its Ends, ſo as that the *Cubitus* may have Room enough to bend.

The *Scapula* ſhould be joined to the Ribs, before the Head of the *Humerus* is perforated; therefore perforate the middle Cavity in the Neck of the *Scapula*, that there may be a Paſſage to the Inſide of the Bone, through which a twiſted Wire may be drawn, and its Ends croſſed over each other, as in Figure 8.

To know where the Head of the *Humerus* ſhould be perforated, apply the *Humerus* to the *Scapula* in the ſame Poſition it is naturally ſuſpended, and mark the Place where the Wire inſerted into the *Scapula* touches; then begin your Perforation with the *Fibula*, and end it in that *Sinus* carved for the Reception of the ſecond Tendon of the Head of the *Biceps*. Put the Wire, which for this Articulation is pretty thick, through the Ring fitted for the

Cervix Scapulæ, and twiſt the other End in a ſpiral Line; thus it will be made fit for performing all the Motions which the *Humerus* did in the living Body.

II. *Of the Articulation of the Bones of the* LOWER EXTREMITY.

The Compoſition of the Foot is almoſt the ſame with that of the Hand, except in a few Things, which I ſhall mention. The great Toe has the ſame Conjunction with the other Toes as the Thumb with the Fingers: But in the Foot are ſeveral ſeſamoide Bones, and thoſe lying under the great Toe deſerve our particular Notice, becauſe they are large enough to be connected with the Skeleton, and are always found different from the reſt. In the Head of the metacarpal Bone are two *Sinuſes* divided by an intervening Tubercle, which, with the *Oſſa Seſamoidea*, muſt be obliquely perforated with the Needle, and joined by a Wire.

As to the Connection of the Tarſal Bones, the little Toe, and the next to it are received by the *Os Cuboides*, which again is received by the *Os Calcaneum*; through theſe Bones draw

Wires, and faſten them in that Cavity formed by the *Talus* and *Os Calcis*, when joined. Next to the *Os Cuboides* comes the *Os Cuneiforme Medium*, lying under the great Toe, then the *Os Cuneiforme minus*; but ſome would have this Bone placed in the Middle. Theſe three Bones lie in the anterior Part of the Foot parallel; but the fourth, or *Os Cuneiforme Majus*, is more prominent than the reſt. The *Oſſa Cuneiformia* are fixed to the gibbous Part of the *Os Scaphoides*, the Convexity of which lies toward the *Talus*; in this the Bones of the three Toes meet, which are there to be united; but the *Oſſa Cuneiformia* and *Os Cubiforme* ſhould be firſt connected by a Wire drawn tranſverſly through them according to the above given Directions in the *Carpus*.

When you join the *Aſtragalus* to the *Os Calcaneum*, perforate it twice in the *Sinus* made by the bending Action of the anterior Part of the *Tibia* on it, then perforate the *Os Calcaneum*, under which twiſt the Wires. Some perforate both Bones tranſverſly, and draw through the Wire.

The Foot is joined to the *Tibia* and *Fibula*, by perforating the *Talus* and both *Malleoli* with a pretty groſs *Terebra*, and driving through theſe Holes a ſubſtantial Piece of Braſs Wire of the ſame Thickneſs with the *Terebra*, and which will not eaſily bend, then riveting it on each Side.

The *Tibia* is joined to the *Femur*, by making two Holes through that *Foramen* deſigned for extracting the Marrow, to reach the Sides of the Bone; one to terminate in the Place where the *Fibula* is joined, and the other to paſs through the *Fibula:* Then twiſt the Wire according to the Direction given in the *Scapula* that it may form a Circle, tranſmit its Extremities through the Holes in the *Tibia*, and make one End paſs through the *Fibula*, which will, by this Means, be connected to the *Tibia*.

The *Patella* has on its Inſide a protuberant Line, on each Side of which make a Hole, ſo as that they may both meet, and form an obtuſe Angle; put a Wire through both theſe Holes, and twiſt it; then make another Hole in the Tubercle in the Middle of the Head of the *Tibia*, through which draw the other End of the Wire.

Perforate tranſverſly with a groſs *Terebra* the hind Proceſſes of the inferior End of the *Femur*,

Femur, through which Holes, and the Wire-ring inſerted in the Head of the *Tibia*, drive a pretty thick Wire, and thus theſe two Bones will be united *. When you join the *Femur* to the *Coxendix*, take Care the Holes be parallel to each other, leaſt the Foot ſhould incline too much to the Inſide or Outſide. Therefore apply according to the natural Situation the Head of the *Femur* to the *Acetabulum*, then perforate theſe Bones with a long and thick *Terebra*, and ſecure both by driving a Piece of groſs Wire through them.

Of articulating the COXENDIX.

I muſt make a ſhort Digreſſion on account of mentioning the *Coxendix*, therefore I ſhall ſubjoin the Method of connecting it poſteriorly with the *Os Sacrum*, and anteriorly with its Fellow Bone.

This being a broad Bone, muſt be twice joined to the *Os Sacrum*, *viz.* by its firſt and third *Vertebra*. If you have a *Terebra* of ſuch a

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* *Fabricius* uſed another Method of connecting theſe two Bones and the *Patella*, which you may ſee in his Epiſtle to *Pavius*; one Article in it is, that he prevents the Bones from making Motion. *Veſalius* puts a Piece of Wood into the Holes made for extracting the Marrow, and thus he united theſe two Bones.

Length as will perforate the *Os Sacrum*, and reach the oppoſite Side of the *Coxendix*, theſe two Bones may be connected by the ſame Wires, which will thereby be hid. But if you have not a *Terebra* long enough, then perforate the Bones twice above near the firſt *Vertebra* of the *Os Sacrum*, and twice below near the third, and faſten them cloſely with Wires. To join it with its Fellow, make two Holes in each; begin where the Cartilage, now removed, joined the *Oſſa Pubis*, then end in the interior Region, and make the Holes directly oppoſite to each other. Put the Ends of the Wire through the Outſide of one Bone, and through the Inſide of the other, then twiſt them ſo as that they may lie intirely hid, and not looſe. The *Coccyx*, ſometimes compoſed of three, and ſometimes of four Bones, adheres to the inferior *Vertebra* of the *Os Sacrum*, perforate each of theſe twice with a Needle, alſo the inferior *Vertebra* of the *Os Sacrum*, then put the two Extremities of one Wire through all the little Bones of the *Os Coccygis* in their order, thro' the *Os Sacrum*, which twiſt afterward firmly.

Of

Of articulating the VERTEBRÆ.

As to the Method of connecting the *Vertebræ*, ſcarce any Thing has yet been ſaid; ſome are ſatisfied with an Iron Rod poſſeſſing the Place of the ſpinal Marrow for the articulating the ſpinal *Vertebræ*. But this does not anſwer the Deſign; becauſe the *Vertebræ* are ſubject to be turned round *. Others are ſatisfied with drawing Wires through tranſverſe Holes made in them; but the Bodies of the *Vertebræ* are here covered with Braſs like a Coat of mail. I therefore contrived the following Method, namely, I twice perforate the Bodies of the *Vertebræ* in Lines perpendicular, and parallel to each other. When I have annexed the firſt *Vertebræ* to the Head, I begin with the ſecond, and perforate it near the Sides of the *Proceſſus Dentatus* with a groſs *Terebra*, and ſo proceed with the *Cervical* and dorſal *Vertebra*, till I have fixed them all on the ſame Wire. As for the *Lumbar Vertebræ*, I faſten them to the *Os Sacrum*; becauſe, if the Skeleton is at any Time to be taken to

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* *Fabricius* thought to prevent this Inconveniency, by putting thin Laths round the Iron Rod.

Pieces, it may be done with leſs Trouble; the Ends of the Wire are only to be bended on account of their Strength. To join the *Atlas* with the Head, you perforate it in the poſterior Part near that Hole through which the cervical Vein aſcends, alſo the *Ecphyſis* of the *Occiput*, joined to the *Sinus* of the *Atlas*; draw a Wire through the Hole, and the End of it through the *Foramen Magnum Occipitis*, then twiſt both Ends.

Of the Articulation of the RIBS.

The Ribs muſt be faſtened to the *Sternum* and *Vertebræ*. Theſe, when cleaning, ſome Anatomiſts do not ſeparate from the *Vertebræ*, but for what Reaſon I know not, ſince they afterwards join them with Wire. If you know how to articulate one, you can from thence unite all the reſt, for the Method is the ſame: And, in order to this, take the firſt of either Side, (for there you are to begin) apply it to the *Vertebra*, obſerve the Place where they join each other, and there twice perforate the Rib with a *Fibula*, then fit the Rib again to the *Vertebra*, and, having put a Needle through the Holes of the Rib, perforate the tranſverſe Proceſſes, widen the Bore with the *Fibula*, then join the Rib and *Vertebra* with a Wire. Articulate next the oppoſite Rib to the oppoſite Side; afterwards join the ſecond *Vertebra* to the former, and in the ſame manner unite all the Ribs, the third, fourth, *&c.* in their Rank.

The Cartilages of the *Sternum* being cut from the true, and ſome of the falſe Ribs, muſt be rejoined, and the like Articulation ſerves both them and the *Claviculæ* with the *Sternum* and *Scapula*. This may be done either by drawing the Wire once or twice through; the laſt coincides with the Connection of the *Oſſa Pubis* already deſcribed. If you draw the Wire only once through, make one Hole in the Rib, and another parallel in the Cartilage, then twiſt the Wire, when drawn through, in the Inſide of the *Thorax*. Let not the *Sternum* be too dry before joined; if it is, dip it in Water till it re-aſſumes its former Shape; but ſtraiten the Wire gradually as it dries; it would be of Service to uſe the Sticks already mentioned.

To make the Ribs keep their due Diſtance, their Sides muſt be united with a

Wire. Therefore, before you fix the firſt Rib to the Skeleton, perforate it with a *Terebra* about two Inches from the *Sternum*, draw a Wire through the Hole, and twiſt it the Diſtance between the firſt and ſecond Rib, then put the Wire round the ſecond Rib, twiſt it again, and apply it in the ſame Manner to the third Rib, and thus proceed till you come to the twelfth or laſt Rib, which muſt alſo be perforated, afterwards draw the Extremities of the Wire through the Hole, and twiſt them over each other, for ſecuring the whole of your Work as to the Ribs.

Of the Articulation of the SCAPULA *and* CLAVICULA.

To unite the *Scapula* in its proper Situation with the Ribs, mark on both Sides, by a ſmall Line, the Place of the ſecond, fourth and ſixth *Vertebræ*, afterwards perforate it with the *Fibula*. Firſt join the *Clavicula* to the *Sternum*, then annex it to the *Scapula*, which at laſt unite to the *Vertebræ*.

Of

Of the Articulation of the HEAD.

The Head is only to be laid above the Skeleton; in order to this, make a Hole about ¾ of an Inch Diameter in the *Vertex*, directly oppoſite to the *Foramen Magnum* of the *Occiput* for the Iron Rod which ſupports the Skeleton to paſs through. The ſuperior Part, which was ſawed aſunder from the inferior Part of the Skull, when opened, muſt be rejoined; therefore make two Holes in the poſterior Part of each, directly oppoſite, and in a ſtrait Line with one another; draw two Wires through theſe Holes, and twiſt them at ſuch a Diſtance in the Inſide of the Skull, as that it may be opened and ſhut at Pleaſure; or you may fix a Braſs Hinge there, which will appear more neat, and is fitter for the Purpoſe. In the anterior Part put through the *Terebra* between the *Criſta* and *Exterior Lamina*; and in the Hole fix a Pin ſomewhat prominent to enter another oppoſite Hole made in the upper Part of the Skull.

Of the Articulation of the LOWER JAW.

To join the lower Jaw, which finiſhes the Work, perforate the Condyloide Proceſſes, then apply the *Maxilla Inferior* to the Head, obſerve what Places of the Skull are neareſt the Hole both before and behind, perforate theſe Places with a *Fibula*, ſo as the Holes may end in the Cavity of the Skull, then draw a Wire through the *Maxilla*, make its two Extremities enter the Head thro' the abovementioned two Holes, and there twiſt them in the Inſide *.

The Bones of the Skeleton are all now united, but there are other Bones ſtill remaining, as the *Oſſicula Auditus*, and *Hyoides*, which have no Connection with the dry Bones, therefore cannot properly be articulated with the Skeleton *.

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* *Veſalius* ſays, that this Joint is not ſtrait enough for keeping the Teeth together, and hindering the lower Jaw from falling down; he thinks it would appear much neater to join this lower Jaw to the upper *Os*, ſo as that they could be opened and ſhut at Pleaſure; therefore, beſides the former Joint, the acute Proceſſes of the *Maxilla Inferior*, (called *Coronæ*) muſt be perforated, and a ſmall Cord faſtened to them, which muſt paſs under the *Oſſa Jugalia*, and be ſupported by theſe Bones and the *Vertex*, and ſo inclined either towards the Fore or Hind-head, as that the Mouth may open or ſhut at Pleaſure.

The Bones, by their own natural Weight, incline downward, the Skeleton therefore ſhould have two Iron Supporters; one to deſcend through the Cavity of the Spine, and the other faſtened at its *Apex* in the Baſis of the former, to enter the *Lumbar Vertebræ*. The Form of which ſee in Figure 9.

If you would have your Skeleton keep an erect Situation, you muſt have an oblong Caſe to preſerve the Bones from Duſt, and the Injuries of the Air. Erect in the Bottom of this Caſe a perpendicular Iron Rod; and, to make it keep that Poſition, fix it ſecurely with two Iron Pins to the Bottom; afterwards inſert the Head of this Iron Rod between the *Os Sacrum* and the fifth *Vertebra* of the Loins, and faſten to it the End of another Iron Rod by two Pins. To this Rod fix the Back and Neck, then ſcrew on the Head. Afterwards by proper Screws fix the Feet to the Body, and ſuſpend the Arms at the *Scapulæ*.

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* *Fabricius*, after having placed the *Oſſicula Auditus* in their natural Situation, puts them in a ſmall Veſſel, and that Veſſel into a Glaſs, which he hung at the mammillary Proceſs: A very ſtrange Fancy I think.

APPEN-

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APPENDIX.

To make an INFANT SKELETON.

TO perform this Operation, you need only cut off the Head, and extract the Brain, by thruſting up the *Foramen Magnum* an Iron Rod or Wooden Pin, then turning it from Side to Side to looſe and extract theBrain; *Vide Fig*. 9. afterwards fill the Skull with Water, and waſh it as if you were cleaning a Bottle. The ſpinal Marrow is extracted after the ſame Manner by the *Foramina* of the *Inferior Vertebræ*. What remains is the Body, and the like Method is uſed in cleaning it as the Cartilages of the *Sternum* of an Adult. The Fleſh and the Membranes muſt be ſeparated from the Bones with the utmoſt care and caution that no part be damnaged, or the Ligaments cut, the Bones ſeparated, or the Cartilages deſtroyed. The *Sternum* is not to be cut from the Ribs; but the Arms and Legs may be cut off, if you ſee fit, becauſe they can be eaſily reunited without any conſiderable Deformity.

Some uſe to dip the Bones often in boiling Water while they are cleaning them; but I have laid it down for a fixed Rule never to boil, or put the Bones in boiling Water, but only macerate them for three or four Days in cold Water often changed, to ſoften the Fleſh, whereby it may be ſeparated with leſs Trouble *. From hence you may eaſily make Skeletons of ſuch ſmall Animals, whoſe Bones will not admit the Perforation of a Needle. Of this Kind are *Rats*, *Mice*, *Moles*, *Squirrels*, and other living Creatures of the ſame Magnitude; but the Bones of Birds and Beaſts of a larger Kind ſhould be joined with Wires.

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* *Columbus* adviſes to boil the Bones; for, ſays he, if you prepare an Infant Skeleton, take Care not to boil the Bones for any conſiderable Time, becauſe their Appendices will be eaſily relaxed.

COROLLARY.

Before an End is put to this Subject, I muſt ſubjoin, by way of Corollary, a ſhort and eaſy Method of preparing of Skeletons, firſt diſcovered by Chance.

Shut up the Animal of your intended Skeleton in a *Scatula*, and for the Summer put it in a warm moiſt Place to putrify, and as it corrupts, it will produce a great Number of *Animalcula*, which will devour the Fleſh, and denudate the Bones.

Or you may lay your intended Skeleton under the Rafters of a Houſe during the Summer Seaſon; whence Worms will breed, which will intirely conſume the Fleſh, and leave only the bare Bones.

PLATE I. *Vide Pag.* 6.

EXPLANATION.

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1. THE Myrtle Knife.
2. The Crooked Knife.
3. The Knife with a long Handle.
4. The Hook.
5. The Pipe to inflate the different Parts of the Body.
6. The Round Edg'd Knife.
7. The Streight Edg'd Knife.

PLATE II.

Figure firſt, Is the Baſe of a Table, having two Holes in it, thro' each of which paſſes a round Piece of Wood fixed to the Table. This Piece of Wood ſhould, in its lower Part, be made in the Form of a *Pe-*

ritrocheum, that a Screw may be fitted to it by which the Table can be raiſed or lower'd at Pleaſure, which ſhould be alſo ſupported with Planks for greater Security.

Figure ſecond, Shews the Surface of the Table fixed on its Baſe by the Screw.

Figure third, *Vide Pag.* 113. *Lin.* 1.

a. A Baſe made of a thick Plank.

b. b. Two Columns of Wood.

c. A Hole in the Form of a Parallelogram.

d. d. Square Pieces of Wood that paſs thro' the Columns.

e. e. Two concave Pieces of Wood fixed to the Columns to contain the Head.

f. A Peritrocheum.

g. A Screw, which being turned round, brings the Columns ſo near each other, as to keep the Head faſt.

Figure fourth, *Vide Pag.* 115. *Lin.* 3.

a. A Baſe made of a very thick Plank.

b. b. Two Columns of Wood, one of which is fixed.

c. The other, by turning the Screw, is made to approach or withdraw from the former; on which Account there is

d. A Bow fixed to them full of Holes, that the Diſtance between the Columns may be regulated at Pleaſure.

e. e. Two hollow Pieces of Wood fixed to the Columns to contain the Head.

f. Where the two hollow Pieces of Wood meet.

Figure fifth, a Perforator.

Figure ſixth, a Radula.

Figure ſeventh, a Machine in which they fix the Perforator, and pierce the Bones, by turning it round. *Vide Pag.* 249.

a. The Baſis of the Machine, which the Wedges *b. b.* puſh'd forward, hold faſt.

c. A Piece of Wood that may be turned round, which in its Fore-part

d. Has a ſquare Hole for the Terebra *e.* to be put into.

f. A Bow with a Cord, that turns round the Piece of Wood.

Figure eighth, a twiſted Wire.

Figure ninth, a Piece of Iron, which takes its Riſe from the Anus. The Length of it, as far as the Curve, ſhould reach to the Feet, the Curve ought to enter the Lumbar Vertebræ, whoſe Breadth ought to be ſuch as not to meet the other Piece of Iron there concealed; then the Holes *b. b.* ought to be joyned with the Holes *c. c.* and below, for Security, there ſhould be a Plate of Iron fixed by the Wedges *a. a.* to the Baſe.

b. Another Piece of Iron, which ſhould go along the Spine, and be as long as it, yet ſhould appear a little above the Head, that it may be fixed by the Screw *d.*

FINIS.

Plate.II

Fig. 1.

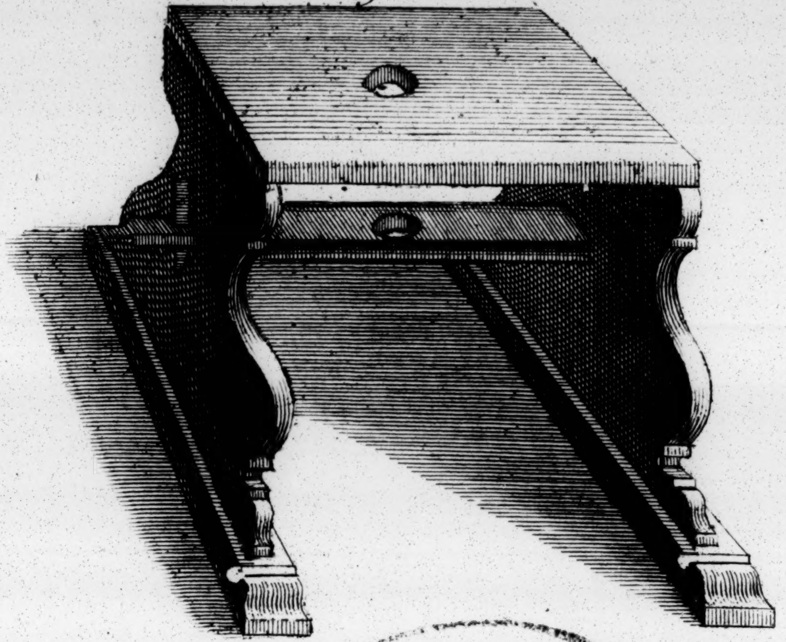

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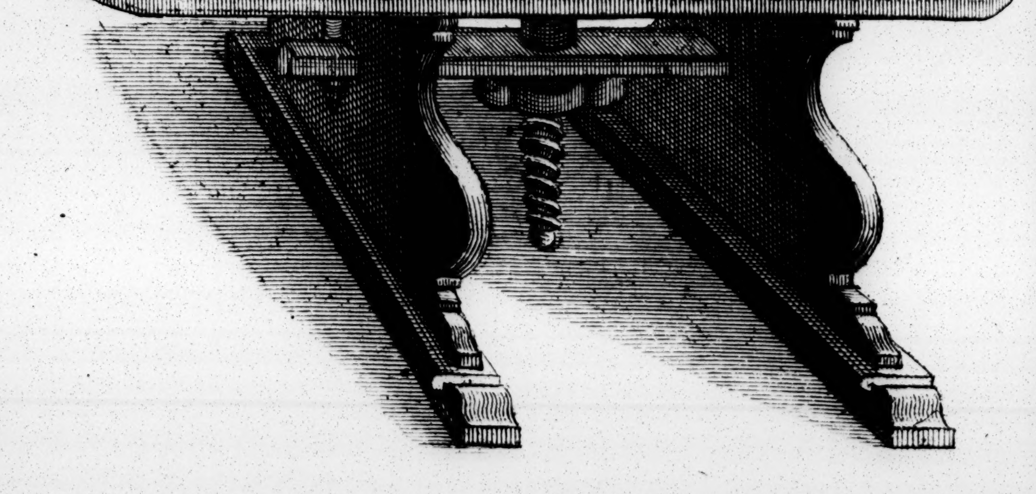
Fig. 2.



t the End

Plate.II.

Fig.7.

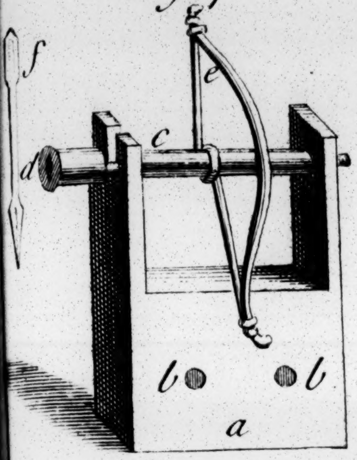


Fig.3.

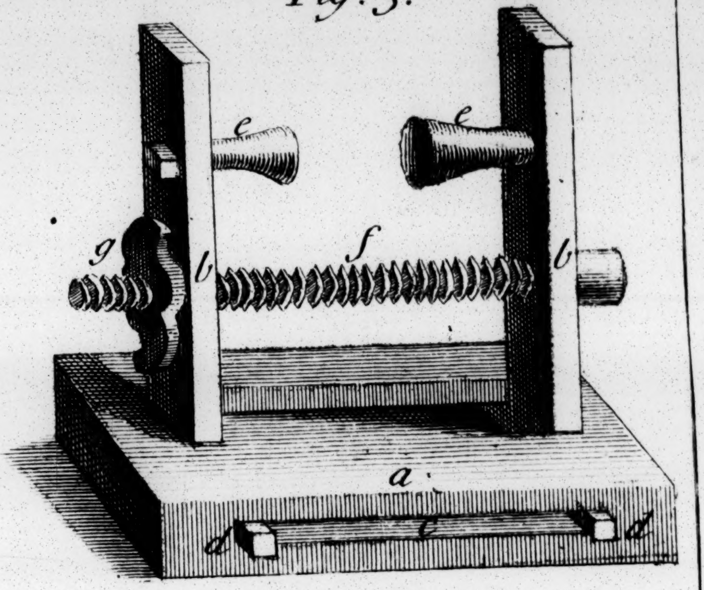


Fig.4.

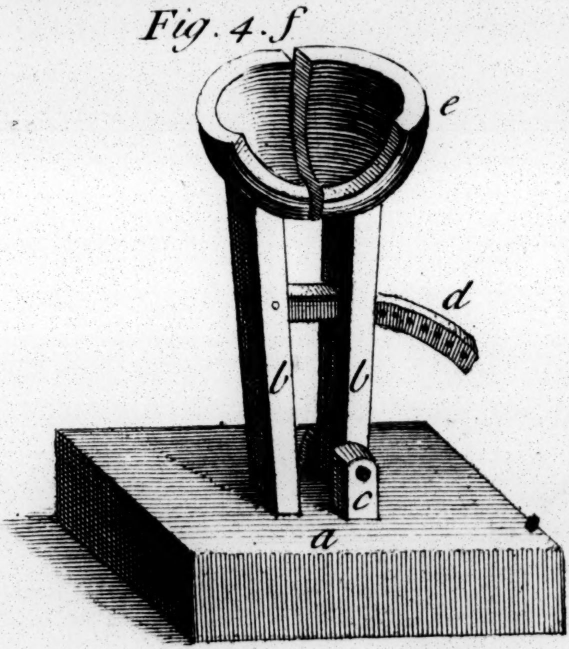


Fig.9.

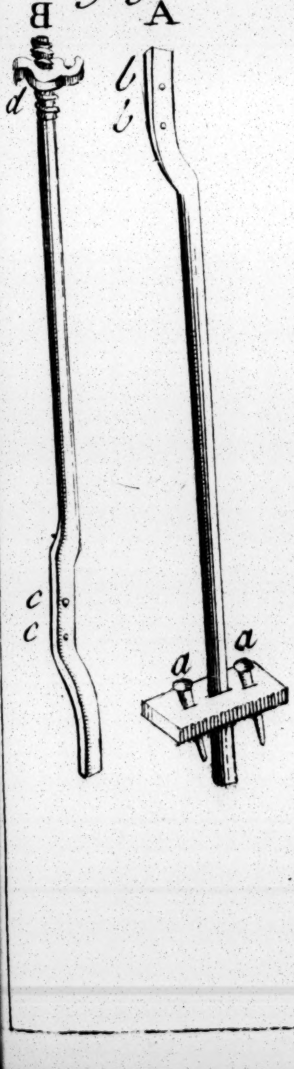


Fig.5.

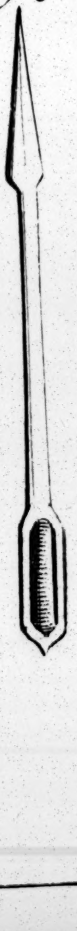


Fig.8.

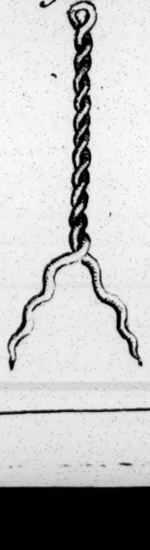
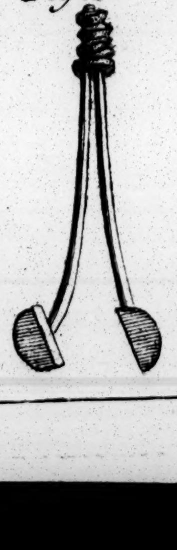


Fig.6.



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